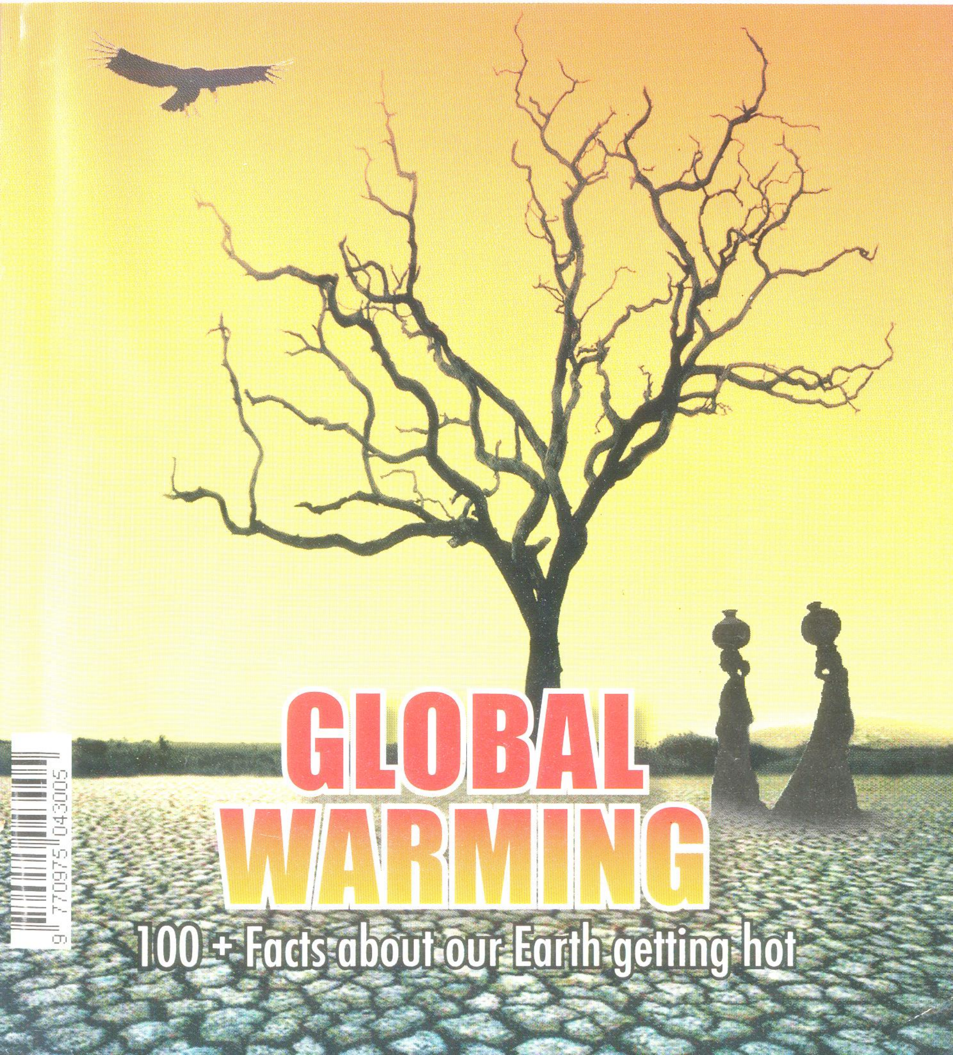
MANORAMA

Tell Me Why

KNOWLEDGE MAGAZINE FOR CHILDREN



GLOBAL WARMING

100 + Facts about our Earth getting hot

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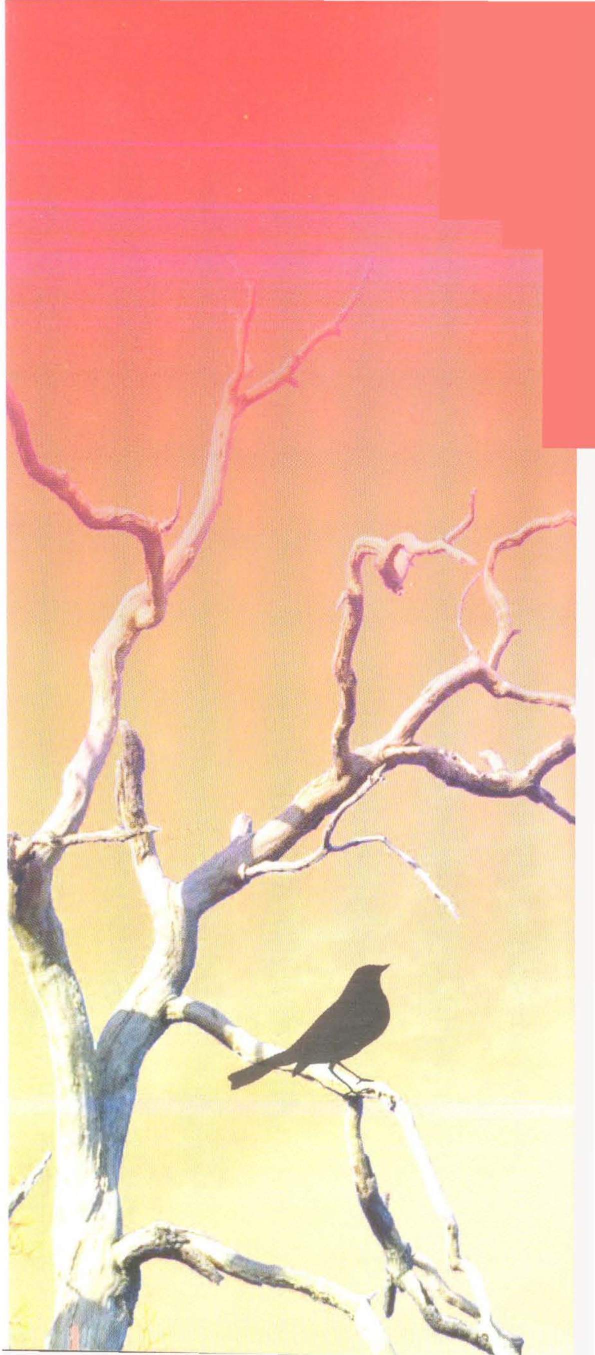
Our world is passing through tough times. The Earth's climate is changing drastically with storms getting more violent, deserts spreading, ice blocks at the poles melting, seas rising, and islands sinking. Global warming is now an accepted reality. This issue of Manorama Tell Me Why brings you some not-so-amusing facts about the alarming phenomenon of global warming.



MANORAMA
Tell Me Why
From the house of MAGIC POT, MANORAMA YEAR BOOK, VANITHA, THE WEEK &
THE MALAYALA MANORAMA DAILY

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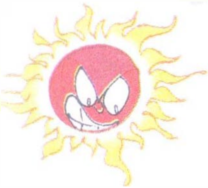
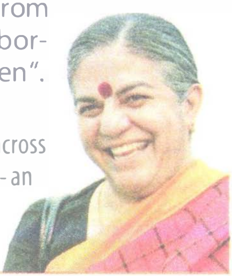
Guest Editorial



For an Earth That's Cool!

"The climate has become unpredictable and uncertain. Climate extremes such as droughts, floods, and cyclones are costing 80 billion dollars damage annually worldwide. Climate change is not an issue of the future. Nor is concern for the environment a luxury. Stable ecosystems, including stable climate systems are the very basis of life, of production and consumption, of stable economies and societies.That is why I am glad Manorama Tell Me Why is bringing out this issue on global warming, for children. Children are our future. And ecology is about sustainability, which is about the future. It is often said, "We have not inherited the Earth from our ancestors. We have borrowed it from our children".



Dr. Vandana Shiva

(Environmental activist known across the world, who heads Navdanya- an organization committed to environmental initiatives.)

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GLOBAL WARMING

What is global warming?

Global warming is the process when the Earth heats up, and the temperature rises. This happens when there is an increase in the production of gases like carbon dioxide, water vapour, nitrous oxide, and methane, which are known as greenhouse gases. These green-

Average Temperature

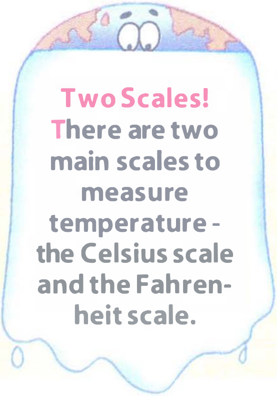
Despite the enormous variation in climates and regional temperatures around the world, scientists use an average temperature for the entire surface of

house gases trap heat and light from the Sun in the Earth's atmosphere, and this in turn, increases the temperature, and causes global warming. Did you know that since the beginning of the 20th century, the average temperature of the Earth has risen by 0.8^0 Celsius? Global warming hurts people, animals, and plants. In fact, many cannot take the change, so they die out.

March 22 - World Water Day
March 23 - World Meteorological Day
April 22 - International Mother Earth Day
June 5 - World Environment Day
September 16 - International Day for the Preservation of the Ozone Layer

I need water...

the Earth to measure atmospheric changes as a whole. The overall average temperature of the Earth has been rising over the past century. The average temperature of the Earth today is about 15^0 Celsius, while during the Ice Ages of the past, it has gone as low as 11^0 Celsius.



Two Scales!
There are two main scales to measure temperature - the Celsius scale and the Fahrenheit scale.

Death Toll

As a result of global warming, the areas of the Earth suffering from drought have doubled since 1970. Over 150,000 deaths are caused globally every year, due to frequent heat waves and droughts, increased floods, and more powerful storms- some of the effects of global warming . In fact, according to a report from the World Health Organization published in 2005, climate related deaths will double in the next 25 years!

Why is the Earth's climate change a cause for concern?

The Earth's climate has been changing for billions of years. It has warmed and cooled many times long before humans were around. The origin of Man can be traced in the warm, relatively benign climate of equatorial Africa, but our ancestors battled the cold, harsh, and unforgiving climate of the last Ice Age in order to spread across the planet. Some 10,000 years ago, however, the Ice Age ended. We developed agriculture, civilization, industry, and technology generally in a global climate that was warm, pleasant, and mostly predictable. Today, people are concerned because the Earth is warming faster now than it has ever done in the past. This warming can threaten our very existence.

Why is climate change an important issue?

Where is my bed?

Around the world, climate change is posing potentially catastrophic and long-term changes to the environment. The sea levels are rising, and Arctic Sea ice is melting. More intense hurricanes are approaching our coastlines, and more glaciers are retreating from the mountain valleys they once filled. Warmer temperatures have led to more intense rainfall in some areas. This can cause flooding. Higher temperatures cause droughts in some areas of the world, causing a decline in crop productivity, which may lead to food shortage. Heat waves have become common, and more living species are becoming endangered.

Meteorology

Meteorology is the science that studies atmospheric phenomena, especially those that relate to weather. It gets its name from the word 'meteor', which in Ancient Greece, referred to any object that appeared in the sky, whether it be clouds, rain, or rainbows. Today, the word meteor refers to small body of matter from outer space that enters the Earth's atmosphere, and appears as a streak of light, or shooting star.

Jean Baptiste Fourier

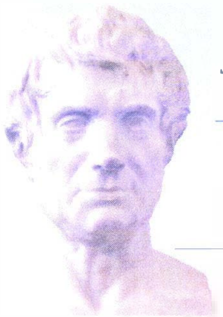
Why is Jean Baptiste Fourier's name associated with global warming?

People have long suspected that human activity could change the local climate.

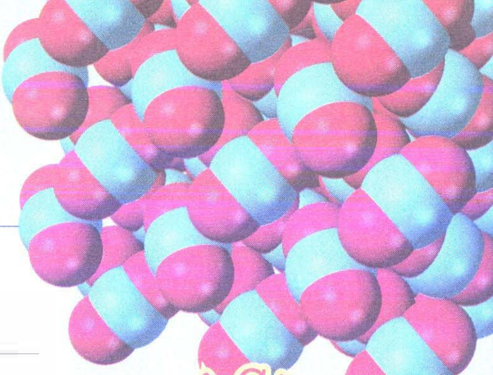
The basic principles of global warming were first noted in 1827, by the French scientist Jean Baptiste Fourier. He observed that certain gases trapped heat in the atmosphere, and he called them green house gases. According to him the Earth's atmosphere act like the glass walls in a greenhouse, which let the sun's rays in, and prevent warmth from escaping. Some gases like carbon dioxide act as a barrier to the heat getting back into space. So, an increase in the levels of carbon dioxide would result in an increase in the temperature of the Earth. Fourier's work was further de-

Spiders' Webs

Did you know that spiders' webs can help us study global warming? This is because they trap droplets of fog, or cloud water. Spider webs are collected by scientists as samples for the study of the changes in the atmosphere.



Bust of Fourier



Crystal structure of Solid Carbon dioxide

veloped by Svante Arrhenius, a Swedish scientist who was the first to claim in 1896, that burning of fossil fuels may eventually result in enhanced global warming. He and Thomas Chamberlin calculated that human activities could warm the Earth by adding carbon dioxide to the atmosphere.

I will take some green house gases to save our Earth.
SODA

More Carbon Dioxide!

There is little doubt that levels of carbon dioxide in the air are rising. Before the Industrial Revolution, the level of carbon dioxide in the air was about 275 parts per million. The average rate of increase from 1960 to 2005, was 1.4 parts per million and between 1995 and 2005, the increase was 1.9 parts per million. After 2007, the increase has leapt to 2.14 parts per million, proving that carbon dioxide is increasing in the atmosphere more and more quickly.

Gas Monster!

The carbon dioxide content of the atmosphere is usually expressed in parts per million, or ppm by weight. At present, the burning of fossil fuels releases 7 billion tonnes of carbon into the atmosphere each year, which in turn, will produce 26.7 billion tons of carbon dioxide gas!

Why is Svante Arrhenius famous?

Svante Arrhenius was a Swedish physical chemist and Nobel Prize winner. He is famous as the father of climate change science. Arrhenius became interested in a debate occupying the scientific community, namely the cause of the Ice Ages. Could it be, he wondered, that vast swings in the levels of atmospheric carbon dioxide, lasting tens of millions of years, were the trigger?

The link between carbon dioxide and the Earth's temperature had been made years before. It was the French scientist Jean Baptiste Fourier, who first realized that certain atmospheric gases

Arrhenius

shrouded the planet like a bell jar, transparent to sunlight, but absorbing infrared rays. He called them greenhouse gases. Arrhenius set himself the task of working out just how much water and carbon dioxide in the atmosphere warmed the planet. He was the first person to realize the possibility that human activities like the burning of coal can double the concentration of carbon dioxide in the atmosphere, and raise the temperature of the Earth.

Life and the Atmosphere

Living organisms have dramatically changed the chemical composition of the atmosphere. Without life on Earth, the atmosphere of our planet would have less nitrogen, oxygen and methane, and more carbon monoxide and carbon dioxide.

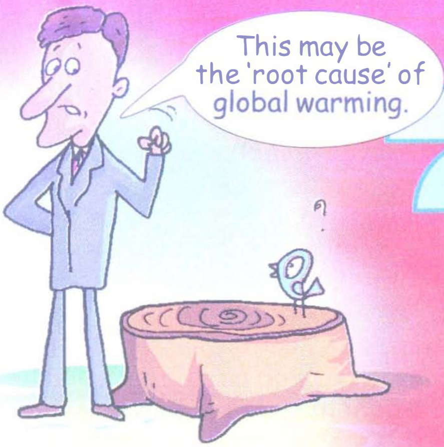
Why is G.S. Callendar important when we talk of global warming?

You probably know that trees extract carbon dioxide from the air. Therefore, it follows that the large scale cutting down of forests upsets the delicate balance of gases in the atmosphere. In 1938, British physicist G. S. Callander determined that higher levels of carbon dioxide had caused warmer temperatures in America and Europe. He produced data from ice cores showing that levels of carbon dioxide in the atmosphere had been rising since the industrial age began. Callendar believed greenhouse warming was on its way, but no one was particularly worried at that time. Callendar's work attracted some attention, and climatology textbooks of the 1940's and 1950's routinely included a brief reference to his studies. But most meteorolo-

G.S.Callendar

Hottest Years

The 13 warmest years on record have all occurred in the 15 years since 1997. The combined average temperature over global land and ocean surfaces for March 2012, was the 16th warmest on record.


This may be the 'root cause' of global warming.

gists did not give much importance to Callendar's ideas.

While Callendar could not prove that greenhouse effect warming was underway, he had given sound reasons to reconsider the question. We owe much to his courage. His claims rescued the idea of global warming from obscurity. Moreover, not everyone dismissed his claims. His ideas attracted scientific curiosity, and attracted new thoughts on the subject.

Where do the first signs of global warming appear?

The ten indicators of climate change include, measurements of sea-level rise taken from ships, the temperature of the upper atmosphere taken from weather balloons, and field surveys of melting glaciers.

The first signs of global warming are seen near the surface of the Earth, and also in the upper atmosphere.

Antarctica appears to be getting warmer. Over the last 50 years, average temperatures on the continent have increased by 2.5^{0}C. In 1995, a gigantic glacier broke off and floated out to sea- another indication that global warming is happening.

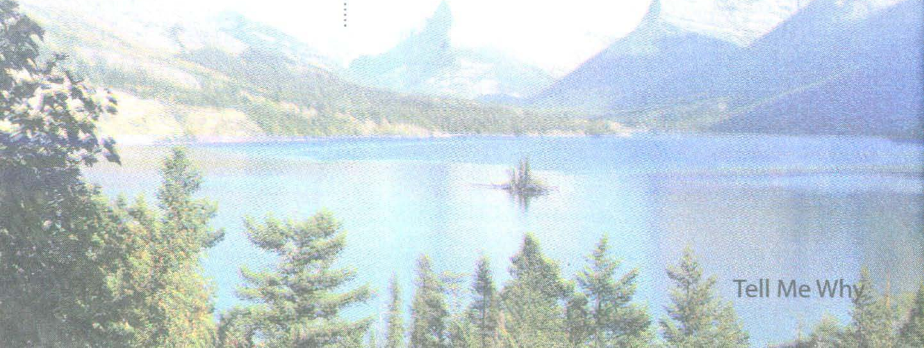
Disappearing Beauty

The Montana Glacier National Park had 150 glaciers in 1850. This gorgeous million-acre park celebrated its 100th birthday recently, but many of its glaciers have melted, and scientists predict the rest may not last another decade. Today, it has just 26 named glaciers, and those that remain are typically mere shadows of their former frozen selves.

Why do we say that the atmosphere causes the greenhouse effect?

The air inside a greenhouse is usually warmer than the outside air because the glass walls of a greenhouse let in sunlight, and have the ability to trap heat inside it. This phenomenon is called the greenhouse effect. This same phenomenon occurs on the Earth, because of its atmosphere.

The Earth's atmosphere is really unique. It is not too hot, and not too cold, and has just the right mixture of gases and water. The Earth's atmosphere contains trace gases, some of which absorb heat. These gases - water vapour, carbon dioxide, methane, ozone, and nitrous oxide- are referred to as 'greenhouse gases'. So, we can say that parts of our atmosphere act as an insulating blanket of just the right thickness, trapping sufficient solar energy to keep the global average temperature in a pleasant range. Without the greenhouse effect, life on this planet would probably not exist as the average temperature of the Earth would be a chilly -18° Celsius, rather than the present 15° Celsius.

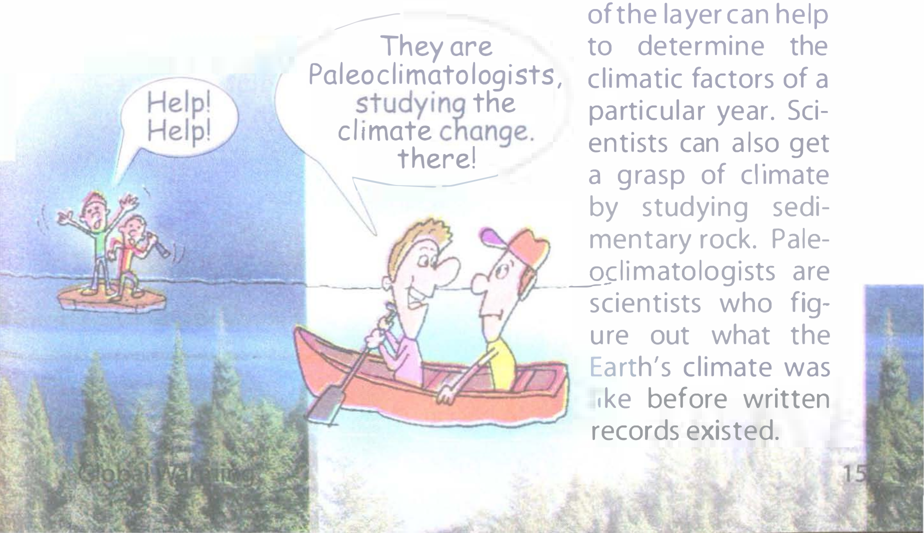


A Modern Green House

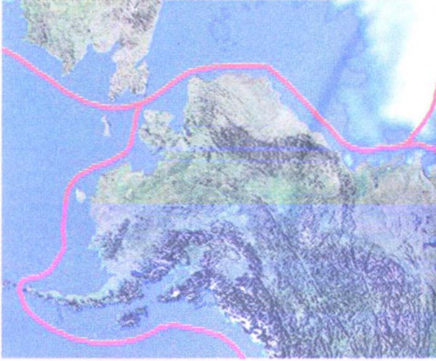
What is paleoclimatology?

Paleoclimatology is a very big name for the study of climate changes that have happened during the entire history of the Earth. Glaciers are a widely employed instrument in paleoclimatology. The ice in glaciers has hardened into an identifiable pattern, with each year leaving a distinct layer in an ice core. The thickness of the layer can help to determine the climatic factors of a particular year. Scientists can also get a grasp of climate by studying sedimentary rock. Paleoclimatologists are scientists who figure out what the Earth's climate was like before written records existed.

Saint Mary Lake at Montana Glacier National Park.


Help! Help!
They are Paleoclimatologists, studying the climate change. there!

The Northwest Passage is one of the most fabled sea routes in the world - a short cut from Europe to Asia through



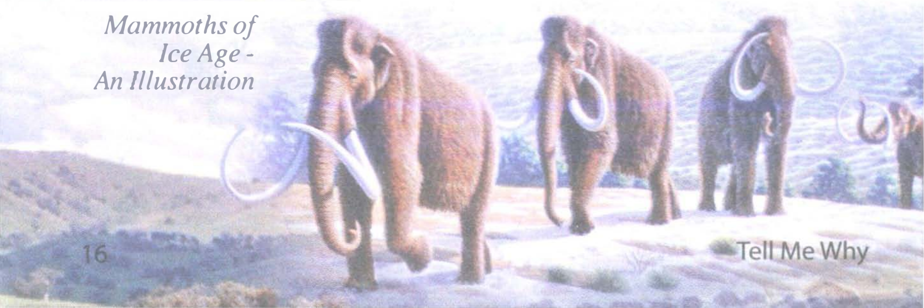
Northwest Passage routes

Why is weather different from climate?

Climate and weather are the two aspects of meteorology. Weather is the day-to-day state of the atmosphere in a region. It deals with sunshine, rain, cloud cover, winds, hail, snow, sleet, freezing

Ice Ages

The Earth has gone through several Ice Ages, during which huge sheets of ice covered large areas of land. There have been approximately 11 Ice Ages that have occurred during the Earth's 4.6 billion years of existence. The last Ice Age was called 'The Great Ice Age', and it occurred 11,000 years ago.

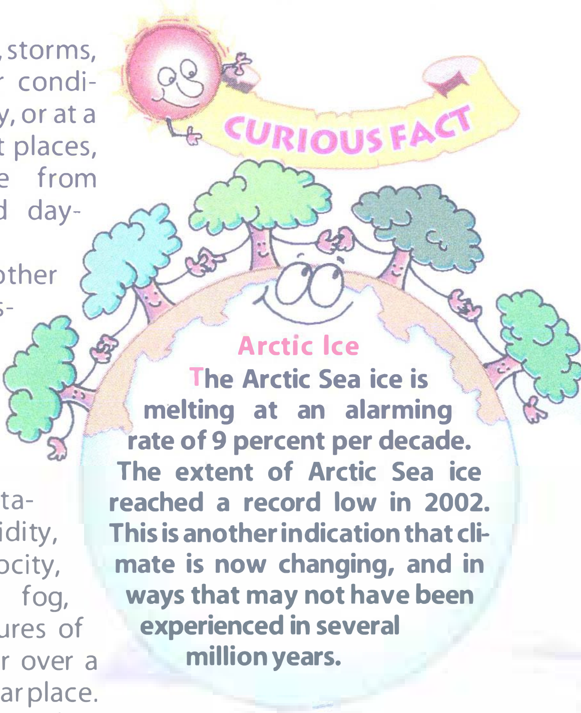


Mammoths of Ice Age - An Illustration

the Canadian Arctic. Historically, the Northwest Passage linking the Atlantic and Pacific Oceans has been ice-bound through the year. Global warming has melted Arctic Sea ice to such an extent, that for the very first time, in over 100 years, ships can sail the North West Passage.

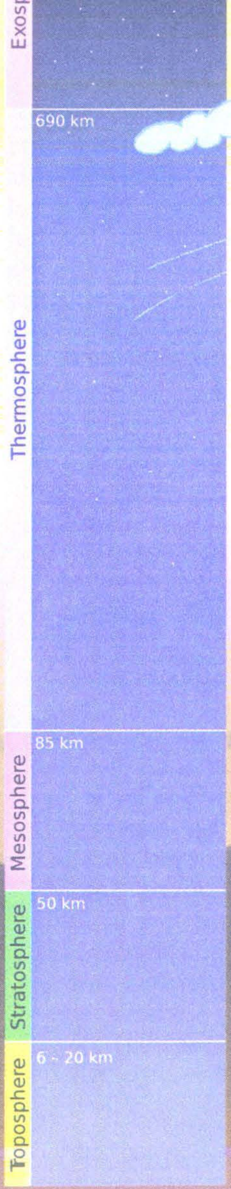
rain, flooding, blizzards, storms, heat waves and other conditions on a particular day, or at a particular time. In most places, weather can change from minute-to-minute, and day-to-day.

Climate, on the other hand, is how the atmosphere 'behaves' over relatively long periods of time. When scientists talk about climate, they're looking at averages of precipitation, temperature, humidity, sunshine, wind velocity, phenomena such as fog, frost, and other measures of the weather that occur over a long period in a particular place. Weather varies all the time, but climate doesn't vary nearly as quickly.



Arctic Ice

The Arctic Sea ice is melting at an alarming rate of 9 percent per decade. The extent of Arctic Sea ice reached a record low in 2002. This is another indication that climate is now changing, and in ways that may not have been experienced in several million years.



Layers of the Earth's Atmosphere.

Hello, I'm happy at the strato-sphere, How are you?

Which are the different layers of the atmosphere?

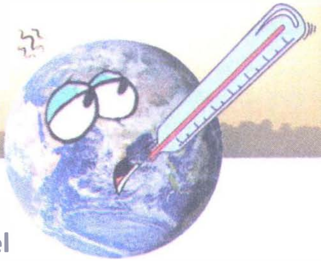
The Earth's atmosphere can be divided into several layers. These layers are divided based on the characteristics of the gases found at that height. Even though scientists have given special names to the boundary between each layer, this does not mean that there is an actual clearly visible border. The change is gradual.

The first layer of the atmosphere is called the troposphere. The troposphere is the layer that we live in, and where weather occurs.

The next layer of our atmosphere is called the stratosphere. Above the stratosphere lies the mesosphere. Above the mesosphere is the thermosphere. Extending from the top of the thermosphere to 10,000 km above the Earth, is the exosphere. The troposphere is known as the lower atmosphere. The stratosphere and the mesosphere form the middle atmosphere, and the thermosphere is the upper atmosphere.

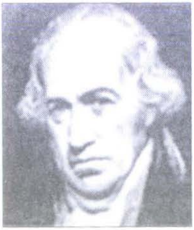
Why do we say that the Sun drives the Earth's weather system?

The Sun is the driving force behind weather. As solar energy reaches the Earth, equatorial regions heat up more than the poles. As land or ocean water warms, it heats the air next to it, and this air begins rising. The heated air rises, and cooler air from elsewhere flows in to replace it. At the same time, the Earth's rotation causes the air to begin turning, as it flows along the ground, or high in the air. The result is a complicated picture with storms and winds carrying cool air toward the tropics, and warm air toward the poles. It is the unequal distribution of solar energy on the planet that causes temperature variations, which in turn, cause the wind and weather.



Measuring Scales

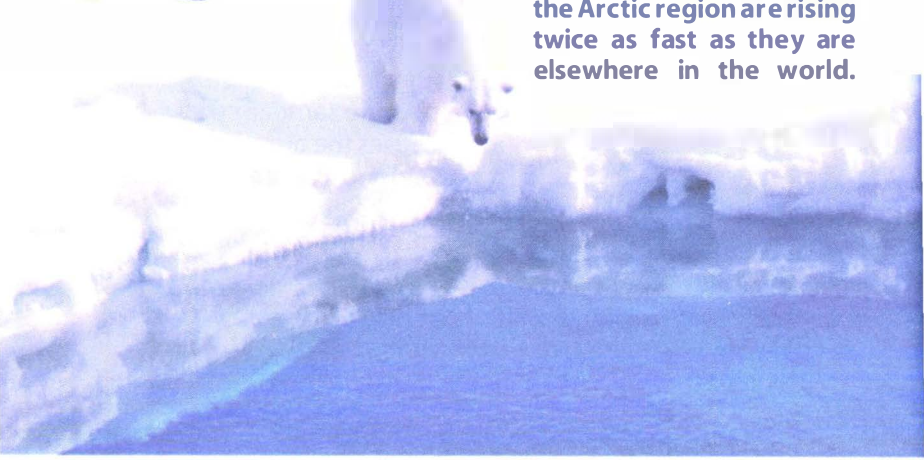
In the 18th century, Gabriel Fahrenheit created the Fahrenheit scale. He set the freezing point of water at 32°F, and the boiling point at 212 °F. Later, Anders Celsius invented the Celsius scale, which is also called the Centigrade scale. He determined the freezing temperature for water to be 0°C and the boiling temperature 100 °C.



Gabriel Farenheit

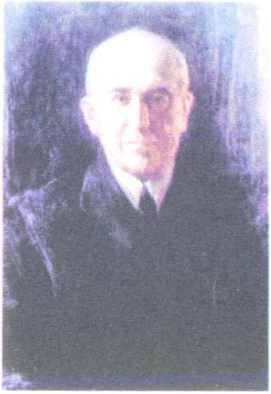
Arctic Disaster

The Arctic is a highly sensitive region, and it is being profoundly affected by the changing climate. Average temperatures in the Arctic region are rising twice as fast as they are elsewhere in the world.



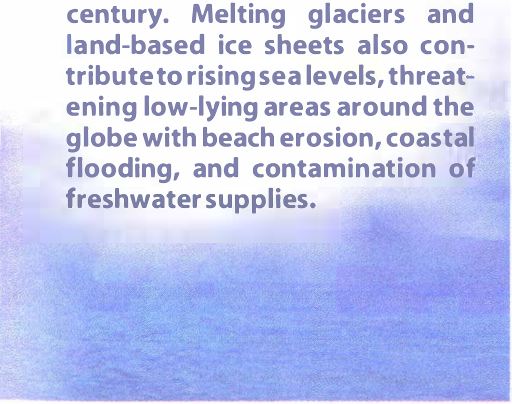
Why is Milutin Milankovitch an important name in climate research?

Milutin Milankovitch is a Serbian astrophysicist who is best known for developing one of the most significant theories relating to Earth motions and long-term climate change. Did you know that interaction between the Earth and Sun, known as orbital variation, changes, and has changed throughout the 4.6 billion year history of our planet? Milankovitch dedicated his career to developing a mathematical theory of climate, based on the seasonal and latitudinal variations of solar radiation received by the Earth.

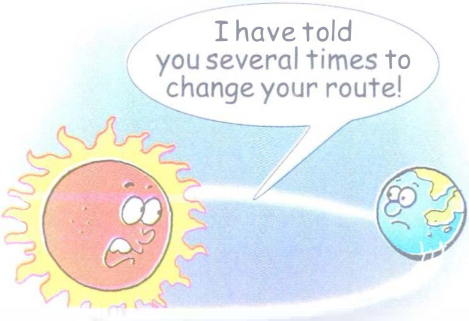


Milutin Milankovitch

Arctic ice is getting thinner, melting, and rupturing. The polar ice cap as a whole, is shrinking. The area of permanent ice cover is contracting at a rate of 9 percent each decade. If this trend continues, summers in the Arctic could become ice-free by the end of the century. Melting glaciers and land-based ice sheets also contribute to rising sea levels, threatening low-lying areas around the globe with beach erosion, coastal flooding, and contamination of freshwater supplies.

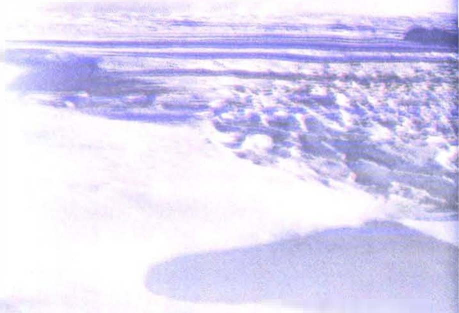


This theory is known as the Milankovitch Theory. Milankovitch estimated climatic fluctuations over the last 450,000 years, and even described cold and warm periods.


I have told you several times to change your route!

How can we know more about climates in the past?

The earliest reliable recorded temperature goes back only about 300 years. However, there are methods to study past temperatures by observing nature. A study of tree rings will give us a clues about the climate of the past. Similarly, the study of corals can also throw light on the climate that existed in the past in a particular region. The study of ocean and lake bed sediments is also helpful in determining the weather and climate of ancient times.

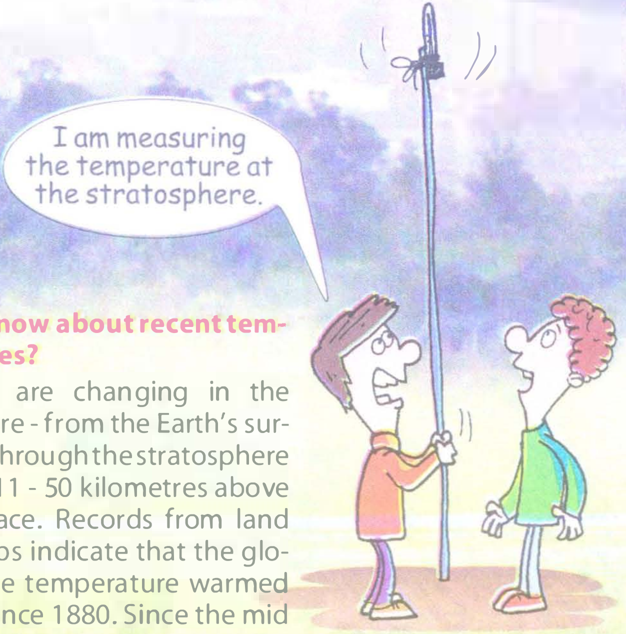


Greenland's Glaciers

CURIOUS FACT

Greenland's Glaciers

Greenland's glaciers keep shrinking as higher surface temperatures have created record mass losses in 2010 and 2011. The ice lost by just one of its glaciers comes to 20 million tonnes per day. The melting ice of the glaciers has led to a dangerous rise in sea levels.


I am measuring the temperature at the stratosphere.

What do we know about recent temperature changes?

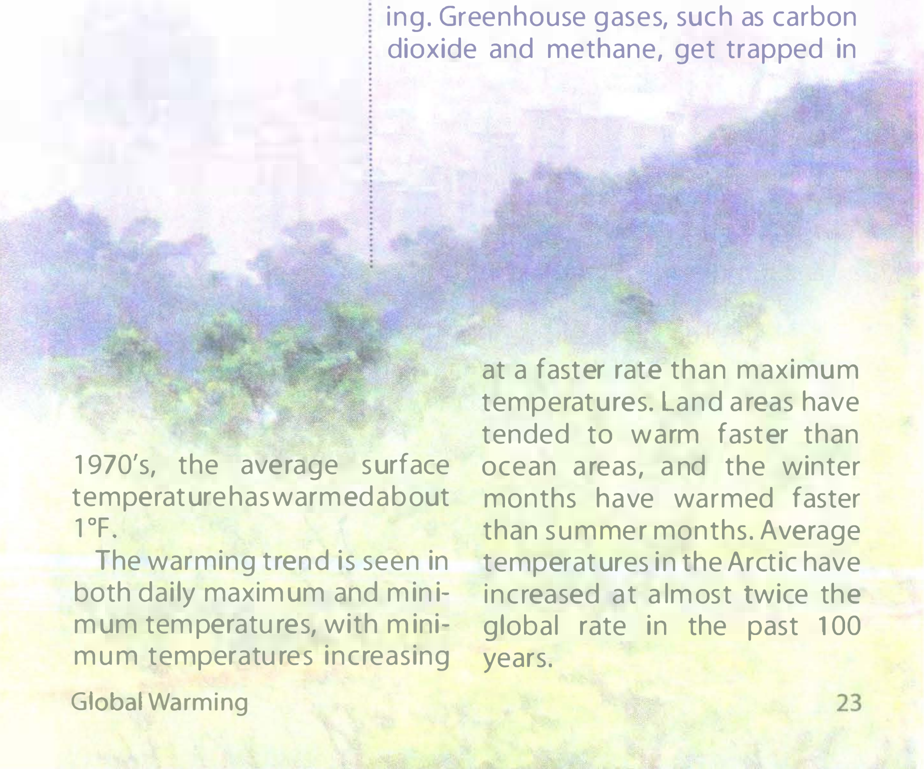
Temperatures are changing in the lower atmosphere - from the Earth's surface, all the way through the stratosphere which extends 11 - 50 kilometres above the Earth's surface. Records from land stations and ships indicate that the global mean surface temperature warmed by about 0.9°F since 1880. Since the mid

Warming Villains

Industry is the largest contributor to global warming. Transportation comes second , residential homes have the third place. Agriculture is also a main villain!

Why do we say that there is evidence to support global warming?

Global warming is the rise in temperature of the Earth's atmosphere. Over the last decade, scientists have provided evidence to support their stand on the threat of global warming. To begin with, temperatures are soaring, and scientists can prove that the first decade of the 21st century is the hottest ever. More recent studies have also revealed that the rate at which global warming is occurring, is also increasing. The rising levels of carbon dioxide in the atmosphere are further proof of global warming. Greenhouse gases, such as carbon dioxide and methane, get trapped in



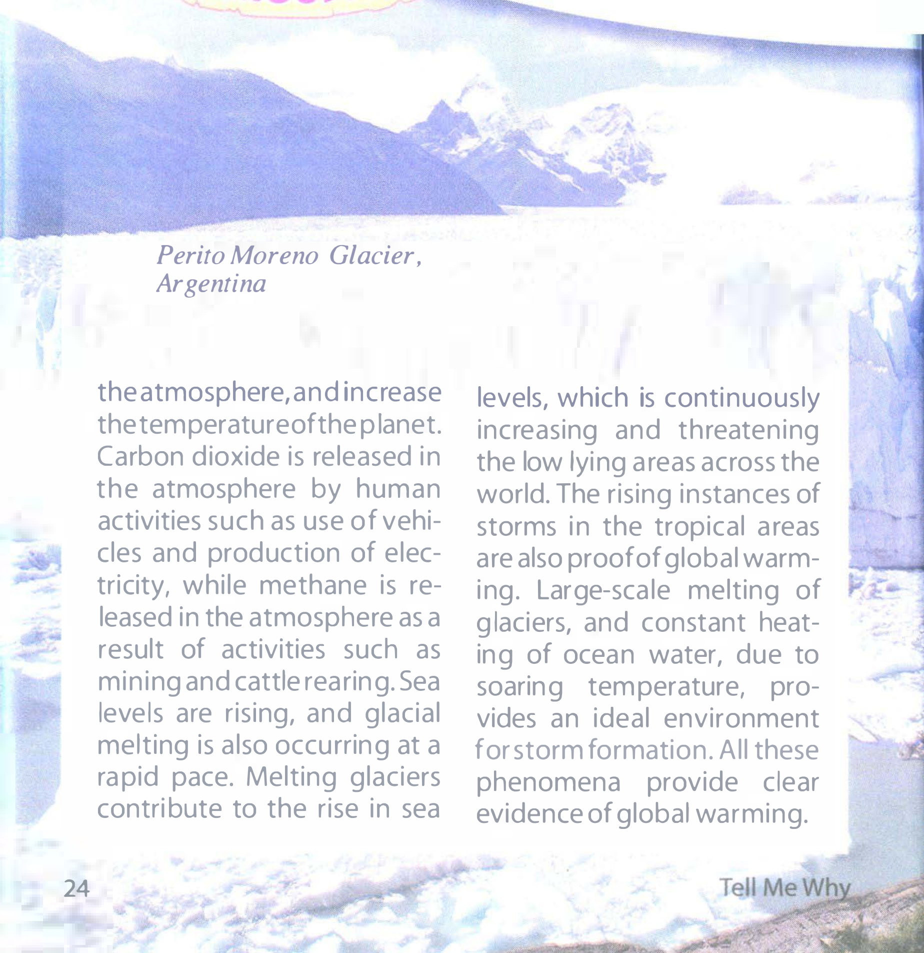
1970's, the average surface temperature has warmed about 1°F.

The warming trend is seen in both daily maximum and minimum temperatures, with minimum temperatures increasing at a faster rate than maximum temperatures. Land areas have tended to warm faster than ocean areas, and the winter months have warmed faster than summer months. Average temperatures in the Arctic have increased at almost twice the global rate in the past 100 years.

Helpful Volcanoes!

Did you know that volcanoes may sometimes actually reduce global warming? This is because a massive explosion would result in huge amounts of sulphuric acid combining with water vapour to form a shield that reflects sunlight away from the Earth. This may cool the Earth for a year or two, but an explosion of this magnitude could prove disastrous in itself!

CURIOUS FACT



Perito Moreno Glacier, Argentina

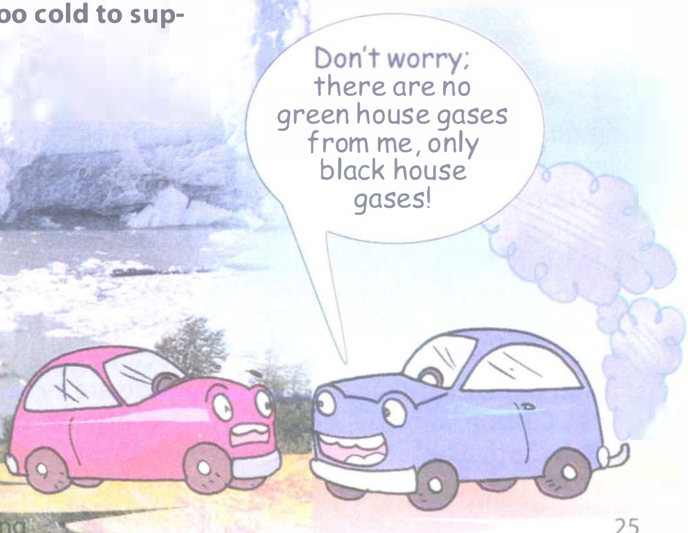
the atmosphere, and increase the temperature of the planet. Carbon dioxide is released in the atmosphere by human activities such as use of vehicles and production of electricity, while methane is released in the atmosphere as a result of activities such as mining and cattle rearing. Sea levels are rising, and glacial melting is also occurring at a rapid pace. Melting glaciers contribute to the rise in sea levels, which is continuously increasing and threatening the low lying areas across the world. The rising instances of storms in the tropical areas are also proof of global warming. Large-scale melting of glaciers, and constant heating of ocean water, due to soaring temperature, provides an ideal environment for storm formation. All these phenomena provide clear evidence of global warming.

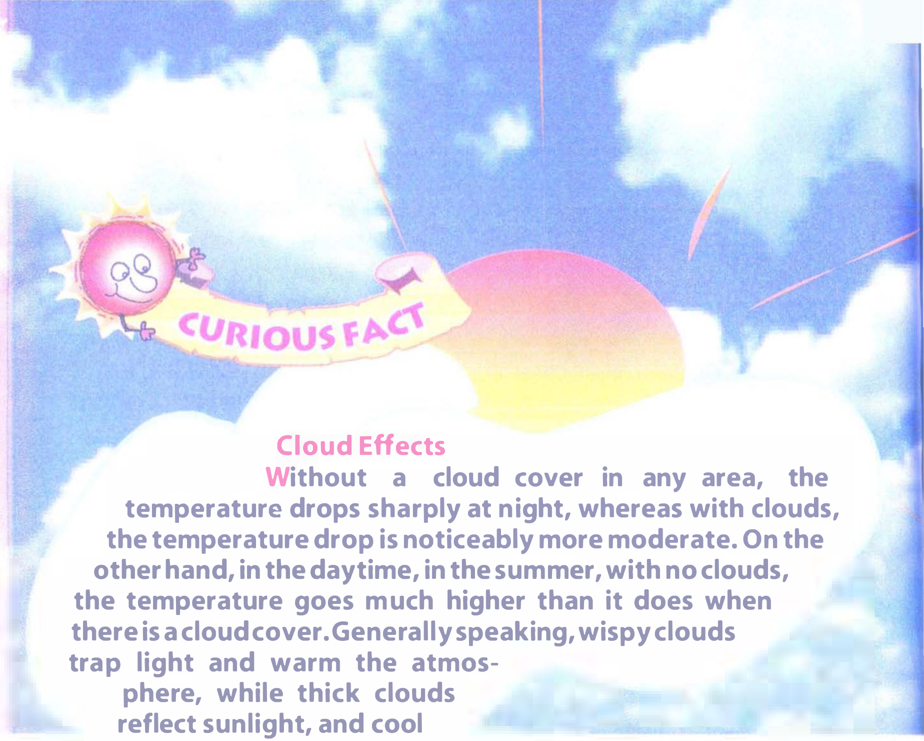
Friendly Water Vapour

Water vapour plays an important role in keeping the Earth at a temperature that is friendly to life. Ice and snow on the Earth's surface reflect sunlight, and if there was no water vapour in the atmosphere to trap the heat, the Earth would become too cold to support life.

Which are the main greenhouse gases?

Greenhouse gases trap heat in the atmosphere, which makes the Earth warmer. Some greenhouse gases such as carbon dioxide occur naturally, and are emitted into the atmosphere through natural processes and human activities. Other greenhouse gases, like fluorinated gases are created and emitted solely through human activities. The main greenhouse gases are water vapour, car-


Don't worry; there are no green house gases from me, only black house gases!



Cloud Effects

Without a cloud cover in any area, the temperature drops sharply at night, whereas with clouds, the temperature drop is noticeably more moderate. On the other hand, in the daytime, in the summer, with no clouds, the temperature goes much higher than it does when there is a cloud cover. Generally speaking, wispy clouds trap light and warm the atmosphere, while thick clouds reflect sunlight, and cool it.

bon dioxide, methane, nitrous oxides, and fluorinated gases.

Carbon dioxide enters the atmosphere through the burning of fossil fuels like oil, natural gas, and coal, as well as by the burning of solid waste, trees, and wood products, and also as a result of other chemical reactions. Carbon dioxide is removed from the atmosphere when it is absorbed by plants. Methane is emitted during the production of coal, natural gas, and oil. Methane emissions also result from livestock, and by the decay of organic waste. Nitrous oxide is emitted during industrial activities, as well as during combustion of fossil fuels and solid waste. Fluorinated gases like hydro fluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes.

Why do greenhouse gases cause global warming?

Some greenhouse gases are present naturally in the atmosphere, and they play an important role in keeping our planet warm enough to support life. However, many human activities produce greenhouse gases too. Burning of fossil fuels, deforestation, urbanization, industrial and agricultural activities, all produce more and more greenhouse gases. The speedy increase in greenhouse gases over the past century is a matter of worry. Do you know why? It is because when this happens, the balance of the greenhouse gases changes, and this has effects on the whole of the planet. Because there are more and more greenhouse gases in the atmosphere, more heat is trapped, which makes the Earth warmer. This is known as global warming. A lot of scientists agree that Man's activities are making the natural greenhouse effect stronger. If we carry on polluting the atmosphere with greenhouse gases, it will have very dangerous effects on the Earth.

STARFACT

Allergic World

You may know that breathing the pollen produced by flowers can cause allergies for many people, but did you know that higher levels of carbon dioxide in the atmosphere will force plants to bloom earlier, and produce more pollen? The result will be that the season during which pollen is produced will be longer- and so, the season for allergies will also be longer, and more intense.

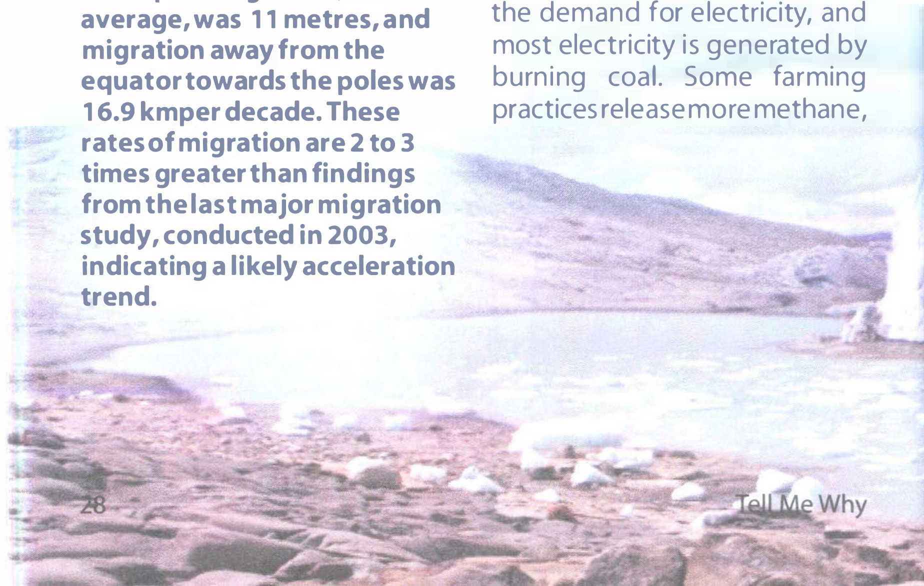
Global Movement of Plants & Animals!

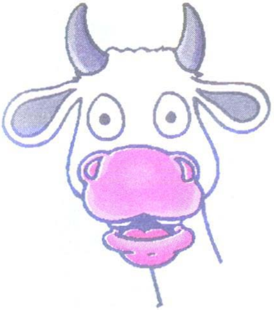
All over the warming globe, plant and animal species are moving towards the poles and to higher elevations, in order to find cooler temperatures. Recent studies have shown that uphill migration, on average, was 11 metres, and migration away from the equator towards the poles was 16.9 kmper decade. These rates of migration are 2 to 3 times greater than findings from the last major migration study, conducted in 2003, indicating a likely acceleration trend.

Why are the greenhouse gases in the atmosphere increasing?

Greenhouse gases occur naturally in the atmosphere, but over the past century, the percentage of greenhouse gases present is increasing. The main reason for this is the burning of fossil fuels like coal, oil, and natural gas for transport, and other man made needs. This releases into the atmosphere carbon, which has been safely stored underground for millions of years.

An enormous demand for electricity is another cause. The growing population of the Earth, and the increasing numbers of refrigerators, air-conditioners and other appliances all increase the demand for electricity, and most electricity is generated by burning coal. Some farming practices release more methane,





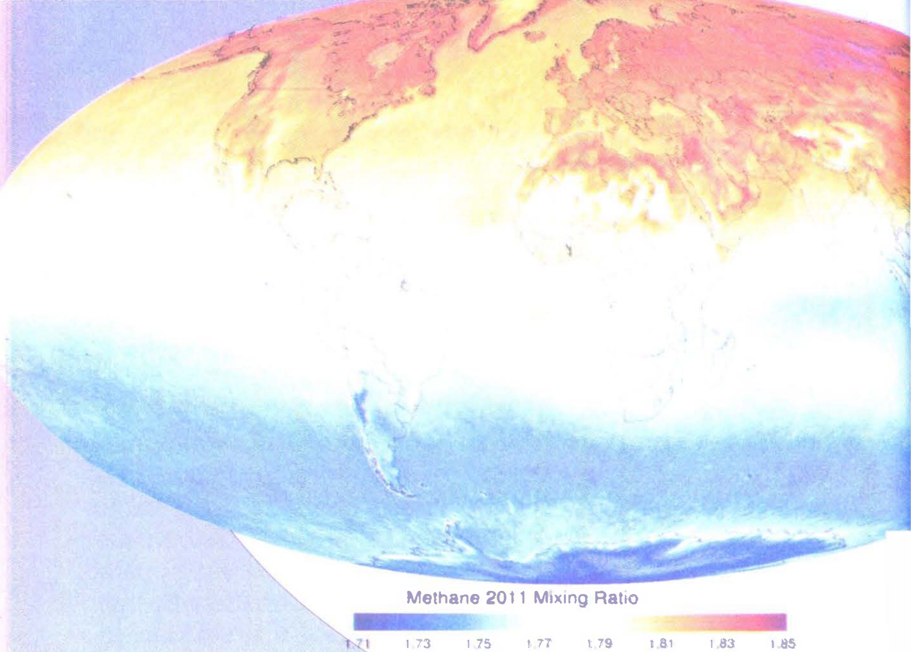
Cows Contribution

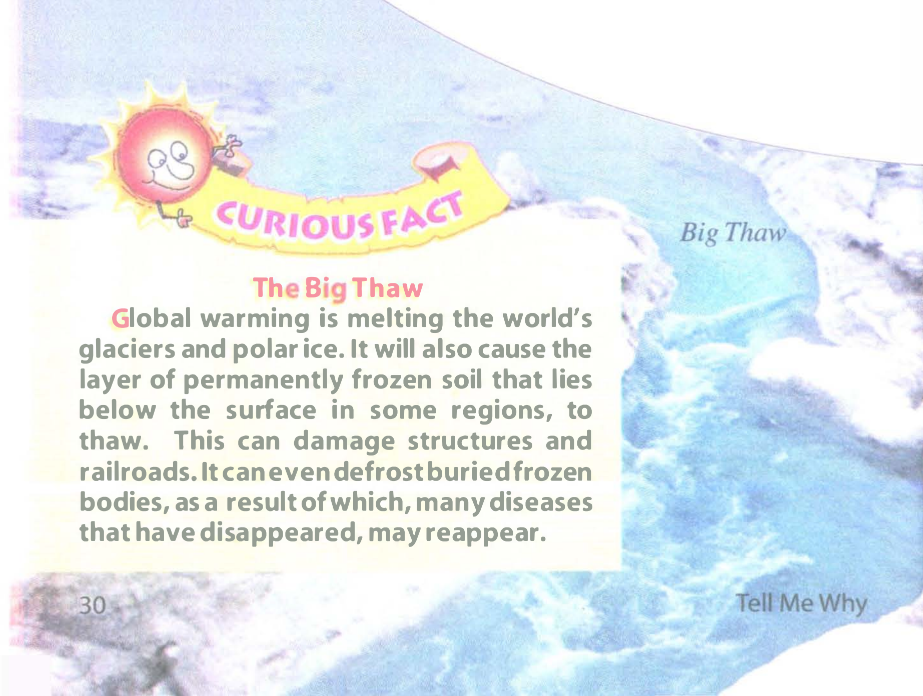
Agriculture is responsible for an estimated 14 percent of the world's greenhouse gases. A significant portion of these emissions come from methane. The world's 1.5 billion cows and billions of other grazing animals emit dozens of polluting gases, including lots of methane. Some experts say that the average dairy cow emits 100 to 200 litres of methane a day!

a toxic greenhouse gas, much more dangerous than carbon dioxide. Cattle belch out methane, and when rice fields are flooded, organic matter decays, releasing methane. The use of fertilizers, and burning of organic matter increases the amount of nitrous oxides in the air. Many factories produce long-lasting industrial gases that do not occur naturally, yet contribute significantly to the enhanced greenhouse effect, and 'global warming'.

The Earth has natural means to actually remove some greenhouse gases from the atmosphere, especially carbon dioxide, which is removed by plants. Global deforestation by mankind means that we have not only increased the output of greenhouse gases, but also that we have significantly reduced the ability of the Earth to reduce at least one of the greenhouse gases.

The Quelccaya Ice Cap




Big Thaw

CURIOUS FACT

The Big Thaw

Global warming is melting the world's glaciers and polar ice. It will also cause the layer of permanently frozen soil that lies below the surface in some regions, to thaw. This can damage structures and railroads. It can even defrost buried frozen bodies, as a result of which, many diseases that have disappeared, may reappear.

What are the sources of methane gas?

Methane gas is responsible for about a fifth of the enhanced greenhouse effect. Methane is lighter than air, colourless, odourless- and this is the gas that animals burp out.

Methane is known as marsh gas. This is because it is produced when plants and other organic matter decompose in the absence of oxygen- for example, under water. Such decomposition takes place in wetlands, swamps, and marshes, and is estimated to produce some 30 per cent of atmospheric methane levels. Methane is produced in the gut of termites, and by micro organisms in the ocean. This gas is also stored in clathrates, which are deposits of methane that lie on the ocean floor. Methane is made by animals, and it can be released as a result of human activities such as agriculture, and fossil fuel production.

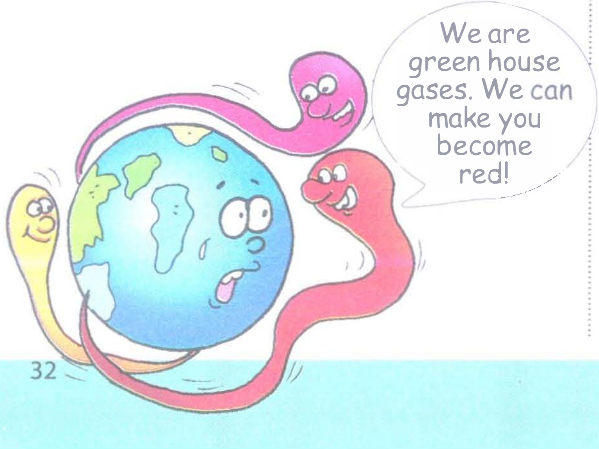
Don't blame me alone. You are also responsible for green house gases!
GLOBAL WARMING

Brown Water

As a result of global warming, temperatures will rise. This will cause more coloured organic matter to run off into lakes. The water in the lakes will become brown. Brown water keeps the sunlight from reaching the bottom of the lake. Algae at the bottom of the lake can't survive without sunlight. The organisms that eat algae won't have enough to eat and many will die. The fish that eat those organisms won't have enough to eat and they too will die.

What is the role of water vapour in global warming?

Water vapour is the most prevalent greenhouse gas in the atmosphere. It accounts for somewhere between 60 percent and 70 percent of the greenhouse effect. All of the other gases like carbon dioxide, methane, nitrous oxide and halocarbons make up the rest. The effect of water vapour is so significant that the global average temperature would be below freezing without it .At the same time, water vapour is also playing a major role in global warming. You know that warm air can contain more moisture than cold air. According to scientists, heat from other greenhouse gases is causing more water to evaporate, releasing the vapour into the atmosphere. That vapour in turn, adds to the greenhouse effect, further warming the atmosphere, and causing more water to evaporate. So the cycle goes on, and global warming is speeded up.


We are green house gases. We can make you become red!

Warming and Diseases

It is believed that rising global temperatures will increase the spread of malaria – the deadly mosquito-borne disease that affects millions of people worldwide. Warmer temperatures mean that malaria carrying mosquitoes are able to live in northern climates as well. This will lead to a surge in malaria in regions beyond the tropics, and at higher altitudes as well.

Why do we say that cities contribute to global warming?

Cities are a key contributor to global warming, as city activities are the main source of greenhouse gas emissions. Cities are home to 50 percent of the world population. These urban areas generate about two thirds of all carbon dioxide emissions. In urban areas, greenhouse gas emissions are caused by the generation of energy, through transportation, industrial activity and the burning of fossil fuels and biomass in households. Electrical energy for public lighting and electricity consumption by households, industry and commerce, are another sources of emissions.

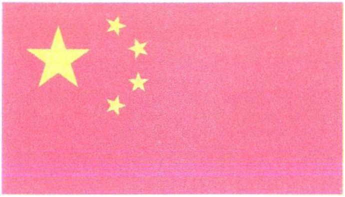
Disappearing Islands

Rising seas, caused by global warming, have for the first time, washed an island-Lohachara Island- off the face of the Earth! As the seas continue to swell, they will swallow whole island nations, from the Maldives to the Marshall Islands, inundate vast areas of countries from Bangladesh to Egypt, and submerge parts of scores of coastal cities. Indonesia has already lost 24 of its islands as a result of excessive mining and other activities that damage the environment.

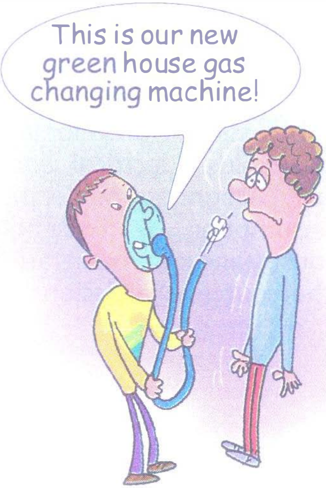
An Island in Maldives

Why China is considered the major contributor of carbon dioxide?

In general, developed countries and major emerging economies lead in total carbon dioxide emissions. In 2006, global carbon dioxide emissions from fossil fuel use increased by about 2.6 percent, and China overtook the United States as the world's leading emitter of carbon dioxide. A new study has found China's emissions increasing 8 percent in 2007. The Chinese increase accounted for two-thirds of the growth in the year's global greenhouse gas emissions, according to the study. China is heavily dependent on coal, and has seen its most rapid growth in some of the world's most heavily polluting industrial sectors. China's emissions are most likely to continue growing substantially for years to come, because they are tied to the country's strong economic growth, and its particular mix of industry and power sources.

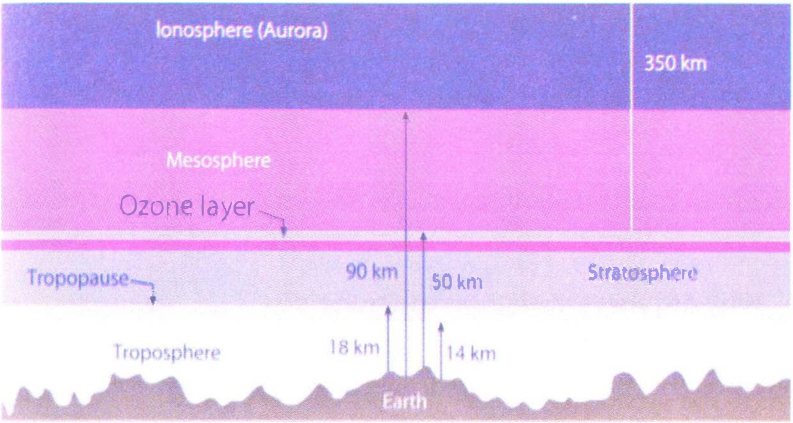


Flag of China


This is our new green house gas changing machine!

Growing Mountains

Over the past century, the Alps mountain ranges have gradually growing taller. This is because the weight of the glaciers in these mountains were pushing down on the surface of the Earth. Global warming has resulted in the melting of glaciers. As the glaciers melt, the weight pushing down decreases, the Earth rebounds, and the mountains become taller.



Why is the ozone layer important?

The Earth is wrapped in a blanket of air called the 'atmosphere', which is made up of several layers. About 19-30 kilometres above the Earth, is a layer of gas called ozone, which is a form of oxygen. Ozone is produced naturally in the atmosphere. Ozone is found in the troposphere, which is the layer closest to the earth, and in the stratosphere, which is the layer above it. Ozone in the troposphere dirties the air, and helps make smog. Ozone in the stratosphere protects life on Earth by absorbing some of the Sun's harmful ultraviolet rays.

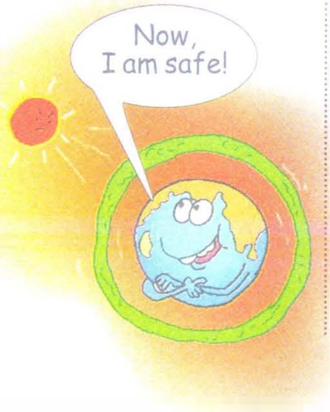
Urban Flooding

Global warming will cause a rise in sea levels, which can cause urban flooding in cities that lie in low lying coastal areas. Of the world's largest 15 cities, 13 lie in coastal areas. Alexandria in Egypt, Long Beach, and New Orleans in the USA, are just some of the cities that are at risk from flash floods and storms caused by climate changes.

A Modern Sea Wall

Why are there variations in Ozone distribution?

Ozone is not distributed equally, but is at its minimum thickness near the Earth's surface, and in the exosphere. Most of it is concentrated in a layer located in the stratosphere, several miles above the surface of the Earth. The thickness of the ozone layer in a vertical column from the surface to the top of the atmosphere, is called the 'total column ozone' amount. Total ozone varies strongly with latitude over the globe, with the largest values occurring at middle, and high latitudes during all seasons. In contrast, the values of total ozone are the lowest in the tropics in all seasons, because the thickness of the ozone layer is smallest there. Total ozone also varies with the seasons, and is in general, thicker in spring, and thinner during autumn in the northern hemisphere.


Now, I am safe!

STARFACT

Sea Walls

Global warming is expected to cause the seas to rise by somewhere between10 centimetres and one metre during this century. Building sea walls is an effective way to protect roads and cities from rising sea level. Sea walls literally prevent sea water from encroaching inland, and provide a buffer against storm surges. However, constructing sea walls is an expensive business, and many poorer nations cannot afford to do so. At the same time, they cannot afford not to take preventive measures.

Thomas Midgley

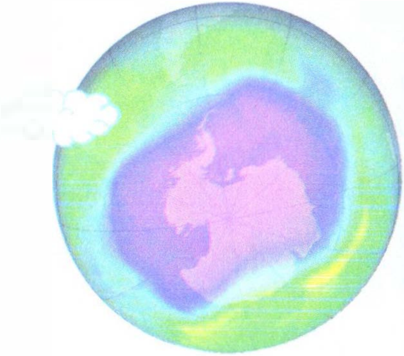
Why is the depletion of the ozone layer happening?

The fact that the ozone layer was being depleted was discovered in the mid-1980's. The main cause of this is the release of chemicals called chlorofluoro carbons(CFCs). CFCs are used in industry in a variety of ways, and have been amazingly useful in many products. Discovered in the 1930's by American chemist Thomas Midgley, CFCs came to be used in aerosol propellants, refrigerators, home insulation, plastic foam, and throwaway food containers.

When CFCs are released into the atmosphere, strong winds can carry them up into the stratosphere where UV radiation breaks them apart, releasing chlorine atoms. Each chlorine atom can attack, and break apart as many as 100,000 ozone molecules during the time it is in the stratosphere. The chlorine from CFC's reduces the amount of ozone in the stratosphere. CFCs also warm the Earth's atmosphere, and global warming results in climate changes all over the planet.

A Factory

The Ozone is depleted!

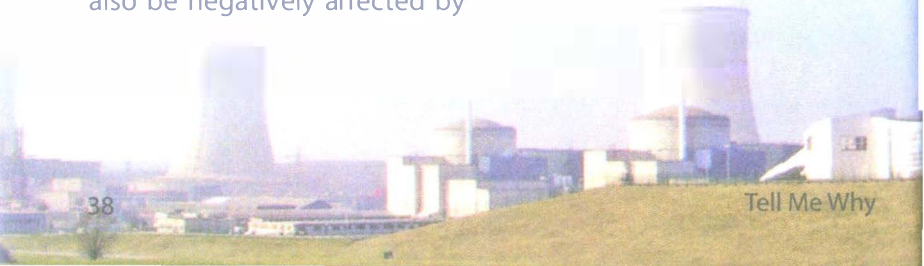


Ozone Hole over the South pole

Why is the depletion of the ozone layer harmful to us?

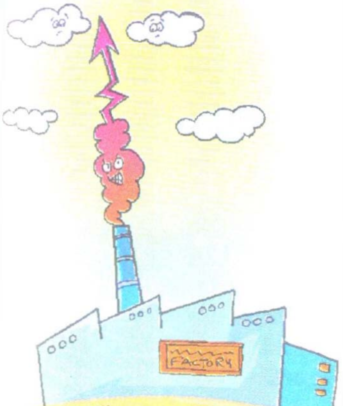
Even minor amounts of ozone depletion can have major effects. Every time even a small amount of the ozone layer is lost, more ultraviolet light from the Sun can reach the Earth. One of the most harmful consequences of ozone depletion is that it can cause skin cancer. In addition to cancer, some research shows that a decreased ozone layer will increase rates of malaria, and other infectious diseases. The environment will also be negatively affected by ozone depletion. The life cycles of plants will change, disrupting the food chain. Oceans will be hit hard as well. The most basic microscopic organisms such as plankton may not be able to survive if the ozone layer is depleted. The planet's climate could also be affected, and wind patterns could change, resulting in climatic changes throughout the world.

A Factory



Ozone Holes

The 'ozone hole' is a loss of stratospheric ozone in springtime over Antarctica. The ozone hole area is defined as the size of the region with total ozone below 220 Dobson units. Dobson units are a unit of measuring ozone layer thickness . The ozone hole has been proven to be a result of human activities that include the release of huge quantities of ozone depleting substances into the atmosphere.



Why is it important to reduce CFC concentration?

We know that CFCs can cause global warming by trapping heat, and that they also deplete the ozone layer. Once these gases are in the atmosphere, they resist breakdown and don't disappear for many decades. In fact, they can remain in the atmosphere for up to 400 years! It is therefore important to reduce the amount of CFC's that are released into the air. One way to do this is to use only CFC-free refrigerators, and to avoid the use of air conditioners.

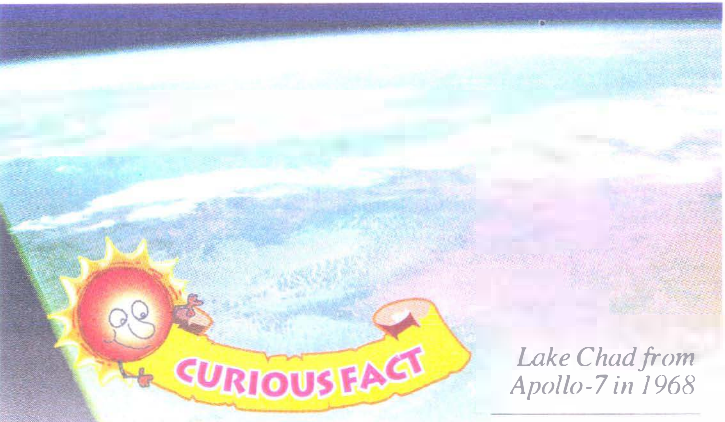
You should also check that any deodorant, spray, solvent or cleaner that you buy is CFC free. The leading nations of the world have agreed to attempt to find substitute chemicals for CFC's. The 1987, Montreal Protocol has reduced the worldwide stock of CFC's and other ozone-destroying compounds by 98 percent. As a result, the ozone layer is expected to recover by the mid-21st century.

Polluting Smoke from a Factory

No green...
Only green
house gases..!

What are the two main causes of global warming?

Global warming can be the result of natural causes- and can also be the result of man-made, or anthropogenic causes. Natural causes are causes created by nature. One natural cause is a release of methane gas from Arctic tundra and wetlands. Another natural cause is that the Earth goes through a cycle of climate change which usually lasts about 40,000 years. Man-made causes, however, probably do the most damage.



Lake Chad from Apollo-7 in 1968

Disappearing Lakes

Global warming is believed to be the reason for the disappearance of an unbelievable number of 125 lakes in the Arctic area in last few decades. The most probable cause is thawing out of the frost underneath the lakes. This lets the water seep out, and be absorbed by the soil, and the lake just disappears!

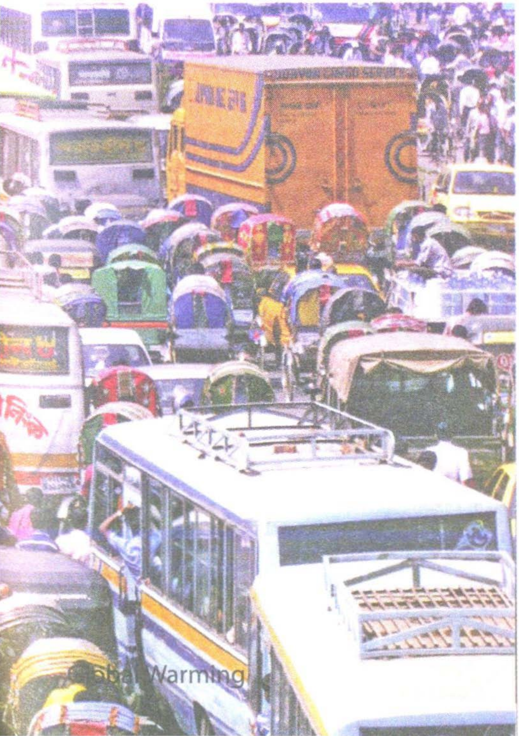
Te

Pollution is one of the biggest man-made problems. Burning fossil fuels is an important cause of pollution. The increased rate of deforestation is another major problem.

Increase in population causes global warming. More people means more food, and more methods of transportation that increase pollution. Animals like cows emit a lot of methane in the air, while many fertilizers also increase the amount of nitrous oxides in the air. Nitrous oxides are greenhouse gases that trap heat, and cause global warming.

Ice Cores

Ice cores record annual and seasonal changes in atmospheric gases and chemicals that were sealed into the falling snow and buried to form ice. These tiny bubbles of ancient air, trapped in polar ice cores have been used to provide records of the climate in the past. It helps better understand the natural fluctuations that have occurred, largely as a result of cyclical changes in Earth's orbit around the Sun. The newest analysis of trace gases trapped in Antarctic ice cores now provide a reasonable view of greenhouse gas concentrations as much as 800,000 years into the past.



Dhaka- Capital of Bangladesh

The Ozone Hole and the Nobel Prize

The discovery of the ozone hole in the Antarctic drew world attention to the impact of human activity on the global environment. In the 1970's, concern about the effect of man-made chemicals, especially

Paul Crutzen

Cricket and Temperature

Did you know that crickets can help you to determine the outside temperature? All you have to do is to focus on the chirp of a single cricket, and count the number of times that it chirps in 14 seconds. Now, add 40 to that number- and the answer will be very close to the air temperature in Fahrenheit.

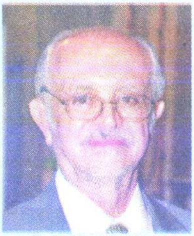
What is the temperature now?

Why can global warming become a disaster for the human race?

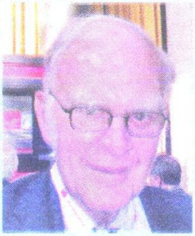
Global warming affects human kind in different ways. It results in a rise in temperature, which in turn, causes the polar ice caps to melt. As the ice caps melt, the sea levels rise, and the temperature of the ocean increases. As the temperature of oceans rises, different species of animals will become endangered. Hurricanes will become

Mount Kilimanjaro in 1998

chlorofluorocarbons, on the ozone layer were raised by Paul J. Crutzen, Mario Molina, and Sherwood Rowland. Their pioneering work was recognized in 1995 by the award of the Nobel Prize in Chemistry.



Mario Molina



Sherwood Rowland

more frequent, and much stronger due to the warmer water. These weather changes can have a serious effect on humans, and destroy many lives. The increase in temperature can also cause an increase in disease carrying insects, as warm moist temperatures are perfect breeding weather.

Mount Kilimanjaro in 2003

Around the world, areas will either become wetter or drier, due to global warming. There will be more droughts which will lead to famine and starvation. Wetter regions can experience floods, which also cause destruction of life and property.

A Rare Gas

Ozone is a natural gas that is found between 9 and 48 kilometres above the Earth, in the layer of the atmosphere known as the stratosphere. It is also a very rare gas- did you know that there are only 3 molecules of ozone in every 10 million molecules of air?

Frogs and the Ozone Hole

A Golden Toad

Since the mid-1980s, wildlife researchers throughout the world have been puzzled by the startling disappearances of a large number of amphibian species. It is now believed that, the depletion of the ozone layer in the stratosphere is responsible for the decline in the frog population, as the increased UV rays from the Sun kill their eggs before they can hatch.

Why do fossil fuels contribute to global warming?

Fossil fuels like coal, oil, and natural gas are the cheapest sources of energy available, but they are also an important cause of global warming. Fossil fuels are formed when organic matter under the surface of the Earth decomposes for millions of years. Burning of fossil fuels for energy releases a large amount of carbon dioxide into the air. The presence of carbon dioxide in the atmosphere makes our planet warmer than any other planet of the solar system. This is because, it traps

the heat obtained from sunlight, and does not let it go beyond the atmosphere.

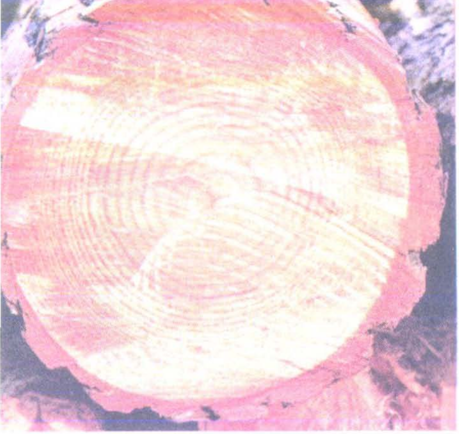
When there is a significant rise in the percentage of carbon dioxide in the air, the amount of heat captured by the carbon dioxide gas also increases. This in turn, leads to overall rise in the surface temperature of the Earth which is also known as global warming. There is no doubt that we depend too much on fossil fuels that release deadly amounts of carbon dioxide into the atmosphere. We need to start considering alternative sources of energy quickly, like nuclear, solar, and wind energy.

An Oil Refinery Fire in Puerto Rico

Why will rising sea levels become a big problem?

Global warming will result in higher temperatures- and higher temperatures will make the water of the seas and oceans rise. Ice melting in the Antarctic and Greenland will flow into the sea. Higher sea levels will threaten the low-lying coastal areas of the world, such as the Netherlands and Bangladesh. Throughout the world, millions of people, and areas of land will be at danger from flooding. Many people will have to leave their homes, and large areas of farmland will be ruined, because of floods. All over the world, sea levels may rise, perhaps by as much as 20 to 40 cms, by the beginning of the next century. So unless we act now to stop global warming, rising, sea levels can pose a real threat to humanity.

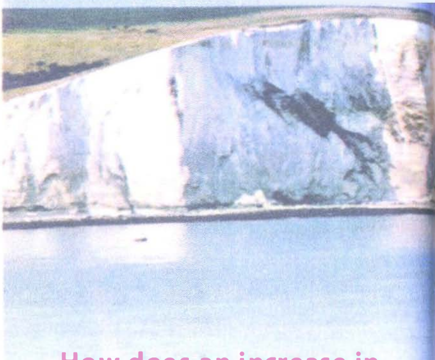
Now, I am safe from global warming.



Tree Rings

Tree Rings and Climate Change

Each year, trees add a layer of growth between their older wood, and bark. Scientists use tree rings as one of many ways to reconstruct climate conditions of the past 2,000years.Traditionally, they've looked at tree ring width and density, as these tell us something about the overall climate in a particular year.



How does an increase in carbon dioxide levels affect oceans?

Carbon dioxide is among the greenhouse gases released by many human activities. Each

Why are cities most affected by rising sea levels?

More than two-thirds of the world's large cities are in areas vulnerable to global warming and rising sea levels. Millions of people are at risk of being swamped by flooding and intense storms. In East Asia, such cities include Guangzhou, Seoul, and Nagoya. In South Asia, Bangladesh's capital,

The White Cliffs of Dover

year, about 36 billion metric tons of carbon dioxide are released into the atmosphere. Increased carbon dioxide levels make the oceans more acidic. This is known to affect the ability of marine animals, such as corals, clams, snails, abalones, sea urchins, and sea stars, to make their shells. The whole balance of the ocean may change. Many varieties of fish will migrate to warmer waters, and new, more exotic varieties may make their appearance. Ocean currents may change, and warm currents may change direction, bringing about climate changes in many regions.

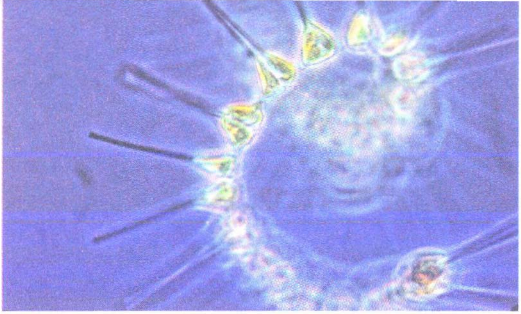
Dhaka, is vulnerable, as are Kolkata and Chennai. Substantial parts of Mumbai, a city of around 13 million people, are already below sea level. Dozens of other cities including London and Rotterdam, Venice, and St. Petersburg are also at risk, and are undertaking massive engineering works to keep out the sea.

I bought a mask to escape from global warming!

A View of Singapore Port

Sky Probe

Every day, at midnight and midday Greenwich Mean Time, hundreds of helium gas filled balloons are launched all around the world. These balloons soar into the upper atmosphere, and automatic instruments on board take humidity, pressure, and temperature readings at regular intervals in different altitudes. The information is transmitted back to Earth, and is very useful in calculating wind speeds.



Phytoplankton

Why are marine phytoplanktons important?

Plankton are the tiny, drifting organisms that live in the top layers of oceans and lakes, and phytoplankton are the photosynthetic portion of plankton life. Marine phytoplankton are mainly single celled organisms. Their importance cannot be overlooked, as animal life is dependent on it. Each form of marine life tends to feed on its smaller organisms, and itself seems to form a food supply for a larger organism. This cycle begins with marine phytoplankton, which forms the basis of marine life.

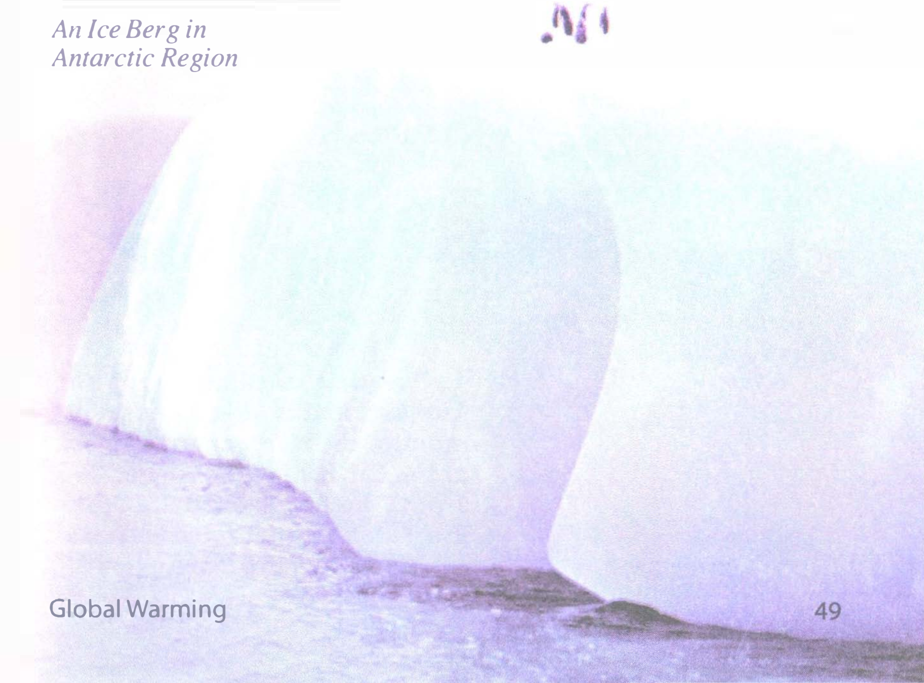
Marine phytoplankton's growth is restricted to around the shallow layer of the water, which receives sufficient sunlight, making it favourable for its growth. However, one of the most significant activities of marine phytoplankton is the influence they have upon the climate. It has been proved that marine phytoplankton can draw nearly as much of carbon dioxide out of the atmosphere and the oceans as all the other land plants combined, and this makes them vital to global carbon dioxide levels. This, in turn, can cause global warming and climate change.

How do ice sheets affect sea levels?

There are two major ice caps in the world that would have a global effect on sea level if they were to melt. They are the Antarctic ice cap, and the Greenland ice sheet. Ice sheets contain enormous quantities of frozen water. If the Greenland ice sheet melted, scientists estimate that sea level would rise about 6 metres. If the Antarctic Ice Sheet melted, sea level would rise by about 60 metres.

The Greenland and Antarctic ice sheets also influence ocean currents, weather, and climate. Large high-altitude plateaus on the ice caps alter storm tracks, and create cold winds close to the ice surface. In addition, the layers of ice blanketing Greenland and Antarctica contain a unique record of Earth's climate history. Studies of ice cores in Greenland have shown that temperatures rose about 10,700 years ago when melting ice affected ocean currents, leading to more extreme climates in different parts of the world.

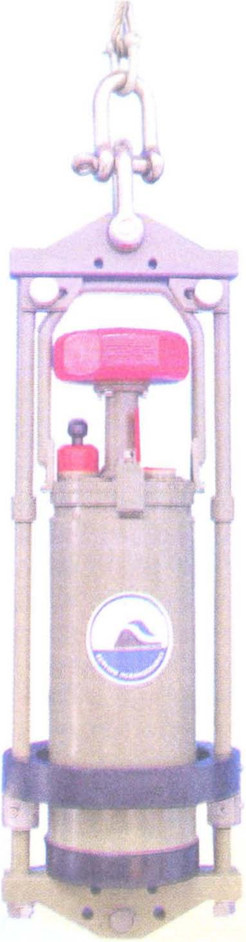
An Ice Berg in Antarctic Region



How does global warming affect ocean currents?

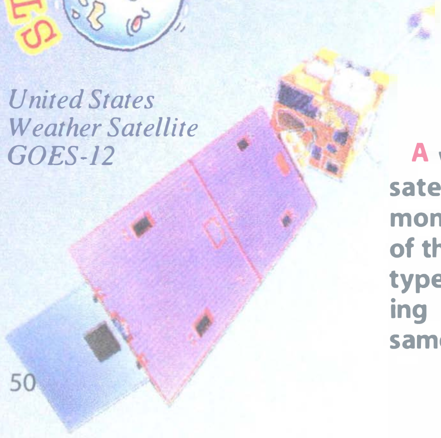
Do you know what ocean currents are? When forces cause water in the ocean to move, it is known as ocean currents. The rotation of the Moon around the Earth causes the force behind these currents. There are circular currents in the north and south of the Pacific and Atlantic Oceans, and one that travels around Antarctica. All of these together are sometimes called the ocean conveyor, because they act like a conveyor belt that carries water around the world's oceans.

Ocean currents have a major effect on climate. The oceans have warm and cold surface currents that act like a global heating and air-conditioning system. For example, the Gulf Stream, in the North Atlantic Ocean, car-



Ocean Current Recording Device

STARFACT



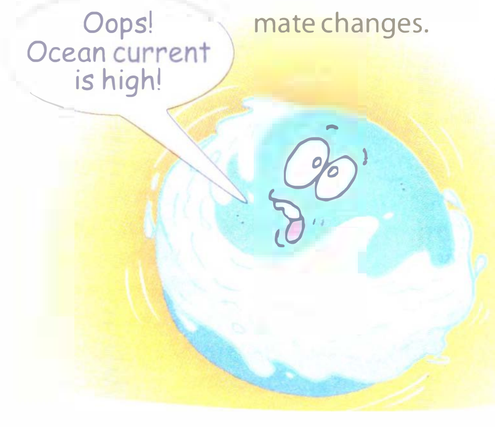
United States Weather Satellite GOES-12

Weather Satellites

A weather satellite is a type of satellite, that is primarily used to monitor the weather and climate of the Earth. Satellites are of two types. The first is the polar orbiting satellite that observes the same swath of the Earth every 12

ries warm salty water from the equator, up to the coast of Greenland in the Arctic. This water travels near the surface of the ocean, because warm water isn't very dense. As it travels to the Arctic, the warm water heats the countries of the North Atlantic, like Britain. It then cools, which increases its density. The dense water sinks to the bottom, where it is carried back to the equator.

Global warming is making the ice caps melt, and they will flow into the ocean, and dilute the salty equatorial water. This will make it less dense, and stop it from sinking. So, global warming could stop ocean currents, and this in turn, will cause drastic climate changes.


Oops!
Ocean current
is high!

World's Climate

The surface of the Earth is curved, and this means that the Sun's rays strike the surface at different angles in different parts of the globe. As a consequence ,the amount of heat received from the Sun varies from region to region, and since the climate depends on the amount of heat received, it too, will vary. The world can thus be divided into five climate zones, with the hottest being near the equator, and the coldest being at the poles.

hours. The second is the geostationary satellite that hovers over the same spot on Earth by orbiting over the equator, while moving at the speed of the Earth's rotation. Geostationary satellites provide a complete picture of global weather every half hour, while polar orbiting satellites provide a continuously changing picture.

Why does deforestation cause global warming?

Forests cover about 30 percent of the world's land area, but they are being cut down at an alarming rate, and this is called deforestation. Cutting down of trees deprives the forest of portions of the canopy which blocks the Sun's rays during the day and holds in heat at night. This disruption leads to more extreme temperatures swings that can be harmful to plants and animals. Trees also help maintain the water cycle by returning water vapour back into the atmosphere. Without trees to fill these roles, many former forest lands can quickly become barren deserts. Trees also play a critical role in absorbing carbon dioxide. More carbon dioxide in the atmosphere will increase the speed and severity of global warming.

Deforestation and the Water Cycle

Trees also contribute in a large way in maintaining the water cycle. They draw up water via their roots. This water is then released into the atmosphere. When trees are cut down, less water is released into the atmosphere, and this results in the climate getting drier in that area. Trees help in preventing the running off of water and help the soil to absorb the flowing water. When there are no trees, water just runs off, and the soil becomes drier, and more barren.

Idiot!
Don't you know about global warming?

Damage to Long Beach Mississippi after Hurricane Katrina

Why does climate change have far reaching effects on the weather?

As a result of global warming, seasons are shifting, temperatures are climbing, and sea levels are rising all over the planet. Climate changes are felt all over the world, with increased rainfall and snow fall in equatorial, polar and sub polar regions, and decreased rainfall in the tropics. There will be more frequent and severe droughts in some regions, and more disastrous floods in others. As the atmosphere grows warmer, the ocean will become warmer too, and this will lead to more hurricanes, cyclones and tornadoes. Extreme weather conditions will prevail, and this will seriously affect plant and animal life. Did you know that climate change could cause a quarter of land animals, birdlife and plants to become extinct?

What is solar wind?

As the Sun burns hydrogen at its core, it releases vast amounts of atomic particles, or pieces of atoms, into outer space. These atomic particles, along with the Sun's radiation, create a sort of wind, known as the solar wind. This wind blows particles outward in all directions from the Sun. The Earth is constantly being bombarded by these particles. The speed of the particles depends on how active the Sun is. The particles could move at over a hundred thousand kilometres in a second.

These charged particles hold a magnetic field. The particles stretch the magnetic field of the Sun around the planets too. If you are a planet or moon with no magnetic field, the solar wind will hit you directly. That's what happens on the Moon. All of these charged particles are constantly hitting the surface that faces the Sun. If you are a planet that has a magnetic field like Jupiter or the Earth, the solar wind will be deflected. Researchers have found that the variations in the energy given off from the Sun affect the Earth's wind patterns, and thus the climate of the planet.

Why are glaciers melting all over the planet?

Everywhere on Earth, glaciers are melting. Glaciers are formed by snow that gets compressed, and forms a thick ice mass over time. The melting of glaciers by itself is a natural process that happens when the temperature rises. The melted ice is, in turn, replaced by a fresh layer of snow. This process goes on, and the glacier keeps getting bigger over time.

However, when the ice melts at a faster rate than the snow that replaces it, the glacier will keep receding, and will finally vanish. From

Seasons

The seasons are caused by the tilt of the Earth's axis as it rotates around the Sun. The tropics have just two seasons- wet and dry. The temperate zone has four-spring, summer, autumn, and winter. Hot deserts have no distinct seasons to speak of. It is always hot!

Wow!
Global warming
saved me!

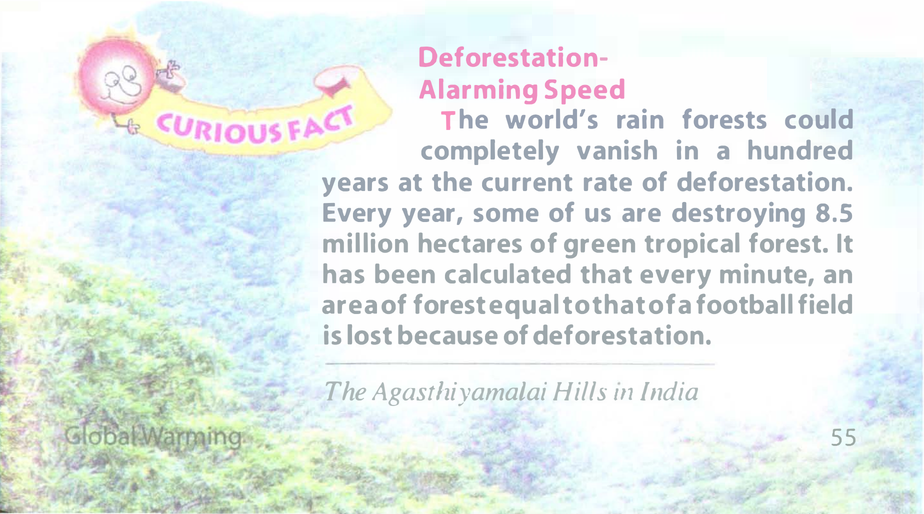
the Arctic to Peru, from Switzerland to the equatorial glaciers of Mount Jaya in Indonesia, massive ice fields, monstrous glaciers, and sea ice are disappearing fast.

The melting of glaciers due to global warming can be disastrous. The reduced ice cover will cause temperatures to rise further. The temperature of the Earth will rise, and so will the temperature of sea water. When the temperature rises, sea water expands, and sea levels rise. Melting water from glaciers will finally empty into the sea, causing a further increase in sea levels. All low-lying areas near the sea will go under water. Some areas will witness floods, other areas will witness severe drought, and agriculture will be severely affected. There will be food scarcity, more forest fires, less hydroelectric power. The list of disasters that could result from melting glaciers are truly frightening.

CURIOUS FACT

Deforestation-Alarming Speed

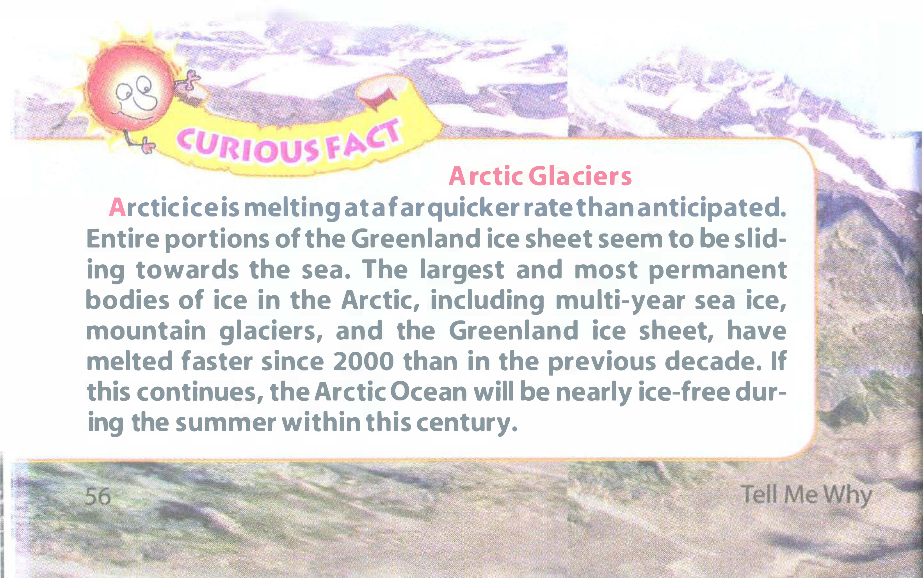
The world's rain forests could completely vanish in a hundred years at the current rate of deforestation. Every year, some of us are destroying 8.5 million hectares of green tropical forest. It has been calculated that every minute, an area of forest equal to that of a football field is lost because of deforestation.


The Agasthiyamalai Hills in India

Why do melting glaciers cause habitat loss?

Glacier ice is melting much faster today than was expected. This has got serious effects on the Earth, and one of these is habitat loss. There are many animals, birds, and fish that depend solely on glaciers for survival. Some bird species depend on fish that are found in the fresh melting waters of a glacier. Melting glaciers will result in warmer temperatures on Earth, and warmer oceans. With an increase in sea water temperature, and rising sea levels, sea-plants that many fish thrive on, will be lost. This will reduce the number of fish, which in turn, will make survival of many bird species difficult. To put it in a nutshell, melting glaciers will cause many animals to die off, due to the disappearance of their habitat. In addition to those creatures that make glacial ice their home, melting glaciers will cause problems for many non-glacial living animals as sea levels rise, and water flow changes. Even coral reefs will be affected when rising sea levels decrease the amount of light allowed to penetrate the water which coral uses for photosynthesis.

Aletsch Glacier in Switzerland



CURIOUS FACT

Arctic Glaciers

Arctic ice is melting at a far quicker rate than anticipated. Entire portions of the Greenland ice sheet seem to be sliding towards the sea. The largest and most permanent bodies of ice in the Arctic, including multi-year sea ice, mountain glaciers, and the Greenland ice sheet, have melted faster since 2000 than in the previous decade. If this continues, the Arctic Ocean will be nearly ice-free during the summer within this century.

I bought a global warming resistant home!

What do you know about the melting glaciers of North America?

The vast North American continent ranges from the lush sub-tropical climate of Florida to the frozen ice and tundra of the Arctic. Climate change is melting North America's glaciers at the fastest rate in recorded history, exposing the country to higher risks of drought and rising sea levels. In the Canadian Rockies, the Athabasca Glacier has retreated about 540 metres in the last 60 years, and has been thinning dramatically since the 1950's-60's. In British Columbia, the Wedgemont Glacier has retreated hundreds of metress since 1979. Glaciers in the Glacier National Park in Montana will be gone by 2070 if the retreat continues at its current rate.

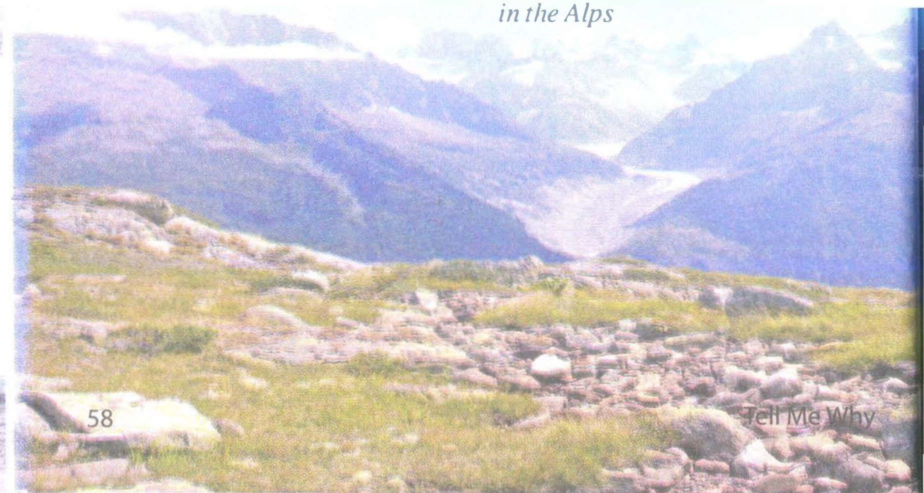
Climate change experts estimate entire glaciers across the Andes will disappear in 10 years due to rising global temperatures, creating instability across the globe as they melt.

Antarctic Glaciers

Antarctic glaciers are melting faster than previously thought, which could lead to an unprecedented rise in sea levels. The biggest west Antarctic glacier, the Pine Island Glacier, is moving 40 per cent faster than it was in the 1970's, discharging water and ice more rapidly into the ocean. The Smith Glacier, also in West Antarctica, is moving 83 per cent faster than it did in 1992. The glaciers are slipping into the sea faster because, the floating ice shelf that would stop them - usually 200 to 300 metres thick - is melting, because of global warming.

Why is global warming affecting the Alps ?

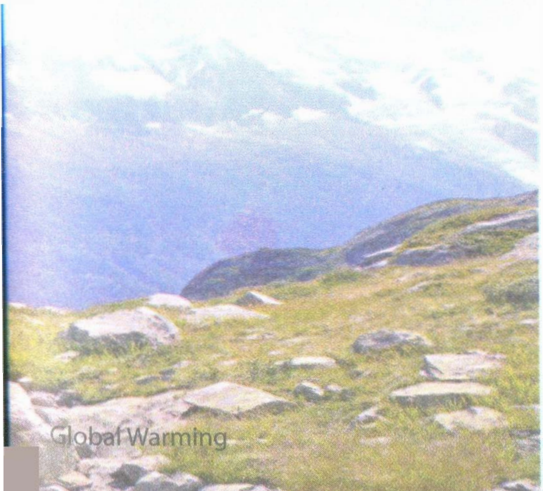
The Alps are spread across the heart of Europe. Alpine glaciers are today under threat from global warming. About 3% of Alpine glacial ice is lost each year because of climate change. This means that roughly 1 metre of ice layer is lost annually. If the melting goes on at this pace, glaciers will be gone by 2030 to 2050- except at some high-altitude sites in the French, Swiss, and Italian Alps.

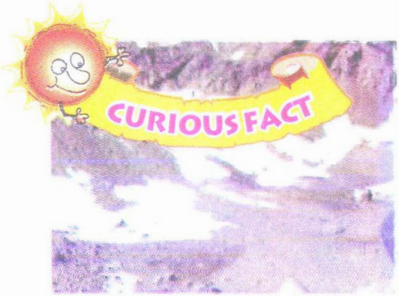


Basement of a Mountain in the Alps

Why do melting glaciers cause fresh water shortage?

Though there is plenty of water on our planet, most of it is salty ,and unfit for drinking. Only 2.5 % of the water on Earth is fresh water, and 70% of it is frozen in glaciers. This frozen fresh water is gradually released when the glacier melts naturally, and is the source for much of the water for the planet's rivers and lakes. The Himalayan glaciers, for example, feed seven of the great rivers of Asia, and ensure a year round water supply to over 2 billion people. Peru and Bolivia also depend on glacial melt for their water supply. However, global warming is causing the rapid shrinking of glaciers. As glaciers shrink, the amount of fresh water available also decreases, and if the rate of shrinkage speeds up, it could lead to severe drought and famine.





The Lewis Glacier in North Cascade National Park

African Glaciers

The iconic glaciers of the Ruwenzori Mountains, which cast a thick mist more than 4870 metres above the equator in Central Africa, have shrunk by 50% over the past 50 years. These glaciers are the highest water source for the Nile River. But the disappearance of this ice threatens dozens of plant and animal species, that call the range home. Rising air temperature is the cause behind the rapid demise of Africa's glaciers, and it is likely that they will completely disappear by 2025.

Mount Carstensz Ice Cap in 1936

Why does melting ice cause flooding?

When glaciers melt gradually in the natural course of events, they provide valuable fresh water for the world. However, global warming is speeding up the melting of glaciers. Glaciers in Patagonia and in Alaska have been losing mass faster, and for longer, than glaciers in other parts of the world.

The third fastest rate of loss is among glaciers in the North West United States, South West Canada, followed by those in the high mountains of Asia including the Hindu Kush of the Himalayas, the Arctic, and the Andes. When glaciers start melting faster, the melted ice feeds rivers at such a fast pace that they flood, causing havoc all over the world.

Glacial lakes caused by melting ice can also burst their banks, and cause disastrous floods when there is continuous, fast melting of glaciers. There is no doubt that people in the Himalayas and other mountain areas must prepare for a tough and unpredictable future due to the rapid melting of glaciers caused by climate change.

I am safe from floods!
READY FOR A FLOOD.

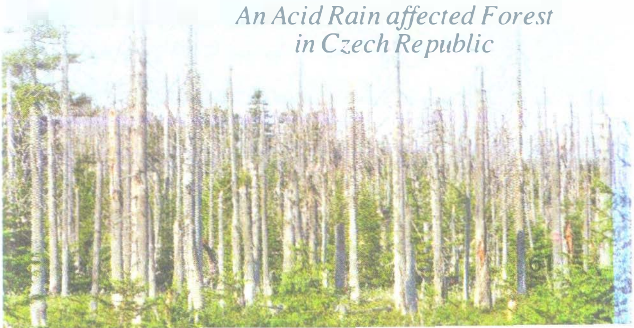
Why is there controversy regarding the Himalayan glaciers?

The Himalayas hold the planet's largest body of ice outside the polar caps, and feed many of the world's great rivers, including the Ganges and Brahmaputra. In fact, there are believed to be about 15,000 glaciers across the Himalayas! Some years back, people were alarmed that many of the glaciers were shrinking, due to global warming.

Today however, it is accepted that the region's glaciers are behaving in different ways. Some are shrinking, but others appear to be growing. In the Karakoram mountain range on the border of Pakistan and China, glaciers have defied global warming to become marginally larger over a decade. Research has shown that the glaciers, to the west of the Himalayan region, have grown by about 11 centimetres. Experts believe that frequent avalanches in the Karokaram region results in the formation of a gravel layer on the glaciers, which plays the role of thermal insulation, preventing the glacier from warming and melting. Increased snowfall in the area may also contribute to the fact that glaciers in the region appear to be growing, not shrinking.

Acid Rain

Acid rain is formed when oxides of sulfur and nitrogen, contained in power plant smoke, factory smoke, and car exhaust, react with the moisture in the atmosphere to make rain acidic. When rain is acidic, it affects lakes, buildings, and farmland. Acid pollution has one surprising effect that may be beneficial. Sulfates in the upper atmosphere reflect some sunlight out into space, and thus, tend to slow down global warming.



An Acid Rain affected Forest in Czech Republic

Why does global warming increase the frequency of hurricanes and typhoons ?

Hurricanes, cyclones and typhoons bring winds and slashing rains that flood streets, flatten homes, and cause great loss to life and property. Hurricanes start when warm, moist air from the ocean surface begins to rise rapidly, where it encounters cooler air that causes the warm water vapour to condense and to form storm clouds and drops of rain. The condensation also releases latent heat, which warms the cool air above, causing it to rise and make way for more warm humid air from the ocean below. Hurricanes and typhoons have become stronger and longer-lasting over the past 30 years- and this phenomenon is linked to global warming. Rising temperatures mean glaciers melt faster, and this in turn, will result in rising sea levels. Rising sea levels cause higher storm surges and more intense storms. In short, global warming is increasing air and water temperatures worldwide, and this makes it easier for hurricanes, cyclones and typhoons to form faster, and gain more destructive force.

Bioclimatology

Bioclimatology is the science dealing with the relations between the climate and the distribution of the living species. This climatology branch deals with the effects of the physical environment on living organisms over an extended period of time.

View of Hurricane Isabel from Space

Why does El Nino happen?

El Nino is an unusual warming of the surface waters of large parts of the tropical Pacific Ocean that happens every few years. During an El Nino, the normally gusty trade winds along the equator in the Pacific relax, or fade. This allows for a huge pool of warm water off the coast of Indonesia to begin to flow eastward toward the Americas. This warm water heats, and adds moisture to the air above it. This in turn, alters storm tracks that blow across the United States and throughout the world. So, El Nino influences climates and temperatures, not only in the region that it occurs, but in other parts of the world as well.

Scientists are still debating why El Nino happens. One explanation is that it is caused by the pollutants emitted by large volcanic eruptions. Others believe that it is due to warmer ocean temperatures resulting from global warming .Did you know that El Nino is Spanish for 'the little boy'? It refers to the Christ child, and was named by a Mexican fisherman, who noticed the climate pattern often formed around Christmastime.

Declining Glaciers

The great majority of the world's glaciers appear to be declining at rates equal to, or greater than long-established trends. In the South Pacific, the tropical Carstensz Glaciers in Papua Province, Indonesia, are melting rapidly. The West Meren Glacier receded 2600 m, since it was first surveyed in 1936, before melting away sometime between 1997 and 1999. In Papua New Guinea, three summit ice domes have disappeared.

CURIOUS FACT

El Nino vs La Nina

El Nino is the warming of water in the Pacific Ocean, while La Nina is the cooling of water in the Pacific Ocean. They are like a brother and his sister- and like a lot of brothers and sisters, El Nino and La Nina don't get along together. In the tropical Pa-

The Palm Trees on Plantation Island in Fiji after a Tropical Cyclone

Why do we say that El Nino affects climate?

Usually, El Nino brings more rain and higher temperatures. El Nino may also bring warmer than normal winter temperatures to the eastern part of the United States. El Nino events cause dramatic changes in the weather systems across both the North and South American continents--from tumultuous rainfall in northern Peru and southern Ecuador, to unusually warm and dry conditions in the North Eastern United States.

El Nino affects the weather in other parts of the world too. The effects depend strongly on the location and the season. The strongest effects on precipitation are in South-East Asia and the western Pacific Ocean, especially in the dry season that stretches from August to November. There are temperature effects throughout most of the tropics. The number of tropical cyclones may also increase. Scientists feel that El Nino

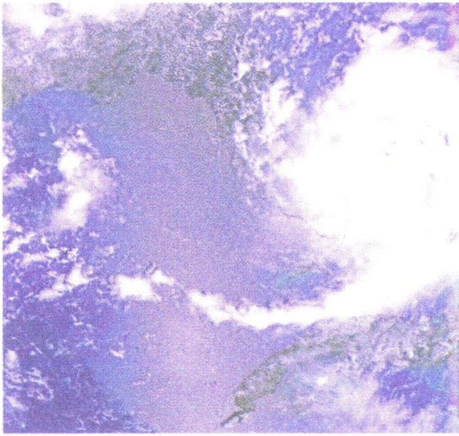
cific Ocean, they are opposites. If you have one, you can't have the other at the same time. La Nina occurs only half as often as El Nino, and La Nina impacts on the world's weather are less predictable than the effects wrought by El Nino. The development of El Nino events is linked to the trade winds. El Nino occurs when the trade winds are weaker than normal, and La Nina occurs when they are stronger than normal.

can cause increased drought in Africa, India and Australia, heavier rainfall in South America, and increased extremes in Britain, of warm and cold weather.

Why is El Nino sometimes followed by La Nina?

La Nina is a climatic condition when sea surface temperatures in the tropical Pacific drop below normal. La Nina can only form after an El Nino. During an El Nino, two types of waves are formed. They are not beach waves, but massive movements of energy through water, and are known as Kelvin waves and Rossby waves.

As Kelvin waves are formed, they push cold water down, which initially causes the ocean to warm. At the same time, another series of waves, Rossby waves, also form under water. They roll towards Asia and Australia. When the waves hit the coast, they reverse and head back towards South America. As the Rossby waves return, they leave cold water closer to the surface. If they bring back just enough cold water, the ocean temperatures return to normal, but sometimes they bring back too much, causing a La Nina after an El Nino. Did you know that La Nina means 'the little girl' in Spanish?



Hurricane Katrina

What are the effects of La Nina on climate?

The term La Nina refers to the extensive cooling of the central and eastern Pacific Ocean. In Australia -particularly eastern Australia- La Niña events are associated with increased probability of wetter conditions. La Nina can also cause cooler than normal ocean temperatures across the central and eastern tropical Pacific Ocean, and increased cloudiness over tropical Australia, Papua New-Guinea, and Indonesia. There will be stronger than normal easterly trade winds across the Pacific Ocean. The consequences of La Nina are nearly the opposite of El Nino in much of the US, including the West.

Which are some recent El Nino and La Nina events?

El Nino and La Nina occur on average every 3 to 5 years. However, in historical records, the interval between events has varied from 2 to 7 years. According to the National Centres for Environmental Prediction, this century's previous La Niñas ocurred in 1903, 1906, 1909, 1916, 1924, 1928, 1938, 1950, 1954, 1964, 1970, 1973, 1975, 1988, and 1995. These events typically continued into the following spring. Since 1975, La Ninas have been only half as frequent as El Ninos. Recent El Nino events were in 1982-83 and 1997 – 98. The 97-98 El Nino was the strongest ever recorded.

A Storm in Pacifica - A city in the Coast of Pacific Ocean

How does global warming affect desert climates?

We know that our planet is undergoing major climate change and that the level of carbon dioxide in the atmosphere is rising significantly. This has had a major effect on the climate of deserts. It has been noted that deserts became hotter since 1976.

Global warming is expected to induce an overall increase in rainfall. However, since regions in the high latitudes are expected to warm more than those in mid and low latitudes, there will be more rainfall in high latitude deserts and less in sub tropical ones. As a result, deserts in the lower latitudes are expected to grow. A new study has found that, as deserts become hotter their soil releases nitrogen, a gas vital for life. Losses of nitrogen in these arid environments, scientists believe, will result in a loss of whatever plant life there is in deserts.

Chasing Carbon Dioxide

The main villain in Global Warming is the carbon dioxide gas. Scientists are alert to observe and measure how much of this gas is present in our atmosphere. One major effort came from NASA, in the form of the Orbiting Carbon Observatory. This was a project to make global measurements of atmospheric carbon dioxide from a satellite. Unfortunately, it failed to reach orbit. Now, NASA is about to relaunch this project.

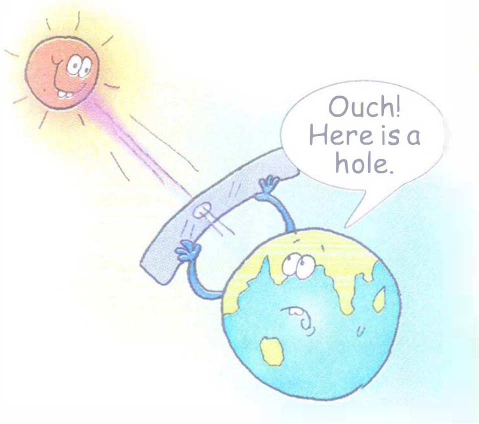
How do clouds affect global climate?

About 60 percent of the globe is covered by cloud. Clouds modulate Earth's radiation, and are also important as a key link in the water cycle and in the transfer of water and heat from the oceans to the land surfaces. Some clouds help cool the Earth, but other clouds help keep Earth warm. Clouds cool the Earth by reflecting incoming sunlight. Clouds also warm the Earth by absorbing infrared radiation emitted from the surface. The process traps heat like a blanket, and slows the rate at which the surface can cool.

The height of the clouds plays an important role in how they affect the climate. Low -altitude clouds reflect some of the Sun's radiation, while high, wispy clouds actually keep Earth warm, by preventing heat from escaping into space, and this can increase global warming.

Why is pollution responsible for an increase in harmful UV rays passing through the Earth's atmosphere?

Did you know that light is made of billions of tiny energy particles called photons? These photons travel from one place to another in waves, and the wavelengths of different colours differ from one another. Most of the light on Earth comes from the Sun which shoots out billions of photons every second in all directions. When the photons reach the Earth's at-


Ouch! Here is a hole.

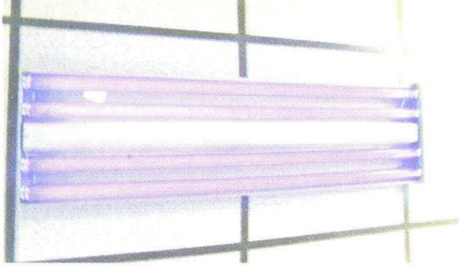
mosphere, photons of visible light pass through it. Some of the photons, though, get absorbed by the ozone layer in the atmosphere - especially those of ultraviolet light, which has a wavelength much shorter than visible light.

Ultraviolet rays can be very harmful to all living things, so it is a good thing that they are blocked by the earth's atmosphere. However, pollution in the form of chemicals such as chlorofluorocarbons and methyl bromide react with ozone in the atmosphere, leaving a 'hole' in the ozone layer that lets dangerous UV rays through.

Human Breath and the Pyramids

The pyramids of Egypt are a major tourist attraction, and are visited by about 2 million people each year. Each visitor exhales about 0.7 ounces of water vapour while inside a pyramid. The combined effect of 2 million people exhaling inside the structure was raising the humidity, and causing damage to the limestone blocks of the pyramid! So, a new ventilation system was recently installed to prevent the pyramids from being destroyed by human breath.

The Pyramids

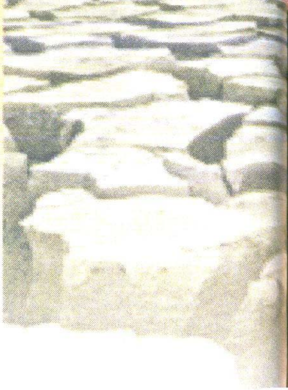


An Ultra Violet Light Source

Why is UV light harmful?

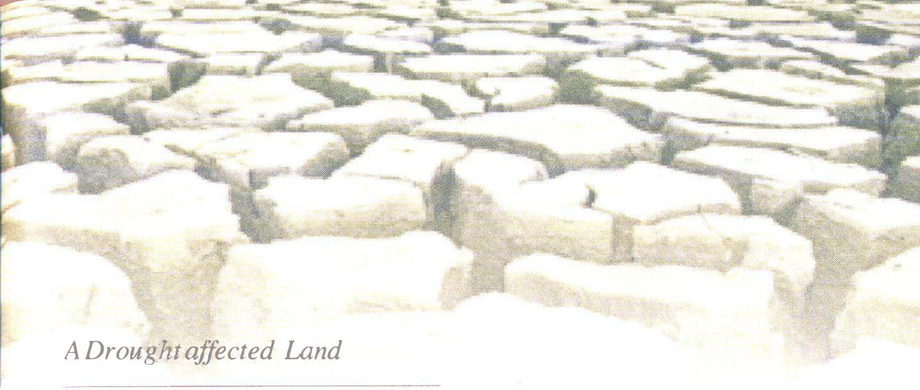
UV rays have some positive effects, it is true. For example, they are necessary for our body to produce vitamin D, a substance that helps strengthen bones. However, the dangers of prolonged exposure to UV rays are very real. One of the first dangers is sunburn, when skin cells are damaged by the absorption of energy from UV rays.

Recent studies have shown that many of the symptoms commonly associated with aging like wrinkles and loosening of the skin may instead be related to UV exposure. Skin cancer is another dangerous effect of UV rays. Ultraviolet rays can be reflected towards the eyes by certain substances, such as sand and snow. When this happens, the amount of UV rays the eyes are exposed to, is increased. This fact is the basis of the condition known as snow blindness. It is also known that cumulative exposure to UV rays is one of the causes of opacity of the eye's lens, called cataract.



Why do we say that global warming results in more diseases?

Global warming is making temperatures rise all over the globe- and a warmer world already seems to be producing a sicker world. Global



A Drought affected Land

warming will likely cause major population upheavals, creating crowded slums of refugees. Not only do areas of high population density facilitate disease transmission, but their residents are more likely to be vulnerable to disease, because of malnutrition and poverty.

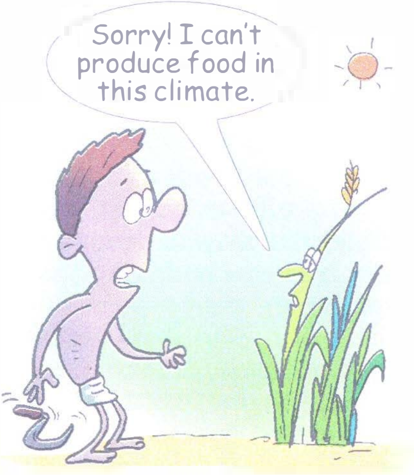
Global warming may increase the infection rates of mosquito-borne diseases. Global warming, and the floods associated with it, are like to increase rates of both malaria and dengue. It also creates conditions that lead to potentially fatal malnutrition and diarrhoea. Global warming already contributes to more than 150,000 deaths and 5 million illnesses annually. According to the World Health Organization, those numbers could double by 2030.

Ladybird Summer

In the summer of 1976, the ladybird population exploded in the UK. Do you know why? It was one of the hottest summers in Europe, and though drought had ruined the crops, the long hot period resulted in millions of ladybirds being hatched.

How does global warming affect food security?

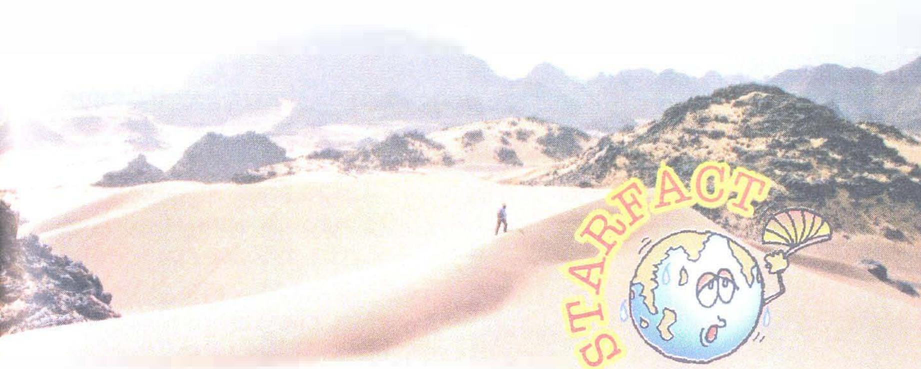
Global warming has a negative impact on agricultural yields. The majority of the world's one billion poor depend on agriculture for their livelihoods, and unfortunately, agriculture is also the human enterprise most vulnerable to changes in climate. Studies have shown that South Asia and Southern Africa are especially at risk, because higher temperatures and drops in rainfall could cut yields of the main crops people grow there. Harvests have already been affected by drought or floods in Russia, Germany, Canada, Argentina, Australia and Pakistan, and it is estimated that half the world's population will face serious food shortages in this century, because of global warming.


Sorry! I can't produce food in this climate.

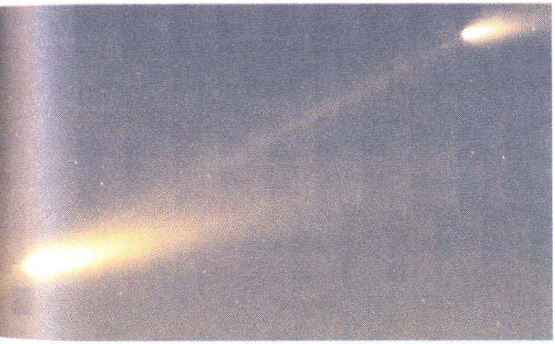
Why do meteors and asteroids bring about climate change?

Asteroids and comets are remnants from the giant cloud of gas and dust that condensed to create the Sun, planets, and moons some 4.5 billion years ago. Asteroids are essentially chunks of rock that measure in size from a few metres to several kilometres in diameter. A meteor is an asteroid that has entered the Earth's atmosphere. It may or may not ever reach the surface of the Earth.

Hey! This asteroid will create climate change!



The Sahara



It has been observed that in the past, the impact of large asteroids and meteors on the surface of the Earth has sometimes resulted in climate change. For example, it is now believed that an asteroid strike 65 millions of years ago resulted in a global winter that led to the extinction of dinosaurs. As a result of the impact, the blasted material was ejected at high velocity into the atmosphere. This shrouded the planet in darkness, and caused a global winter, killing off many species that couldn't adapt to this hellish environment.

STARFACT

The Sahara is Growing!

We know that global warming causes more frequent droughts. One of the results of this is that some of the deserts of the world are growing. For example, the Sahara Desert, the world's largest hot desert, is spreading at the rate of 5 kms a year into the Sahel. The Sahel is a strip of land that divides the desert from the wetter areas. A Sahel has a steppe climate which means rainfall varies there from year to year. It is also quite dry, but does provide some vegetation for animals to graze.

What is a nuclear winter?

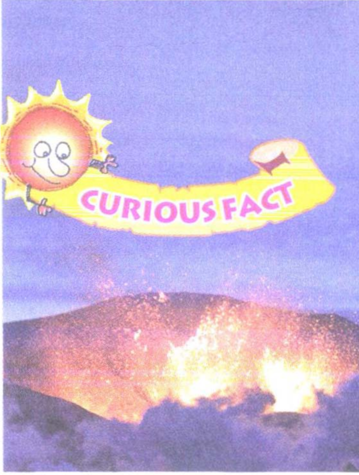
Nuclear winter is a term that describes the climatic effects of nuclear war. If a nuclear bomb is dropped, the sky will blaze with the radiance of a thousand suns. Millions of living things will be burnt to ash. Finally, as nuclear firestorms set cities and forests ablaze, torrents of smoke will ascend into the atmosphere to entomb the planet in billowing, black clouds of ash. Because sunlight would not be able to reach Earth, global temperatures would drop dramatically, and our ability to produce food would be greatly reduced. The result will be noontime darkness, plummeting temperatures, crop failures, food scarcity and the eventual death of life on planet Earth.

Why do we say that volcanoes cause climate change?

Large-scale volcanic activity may last only a few days, but the massive outpouring of gases and ash can influence climate patterns for years. Sulfur gases that are released during an eruption convert to sulfate aerosols. These are truly minute droplets containing about 75 percent sulfuric acid. Sulfate aerosols reduce the solar energy reaching the Earth's surface, resulting in lower temperatures on the planet.

Ash and dust are also thrown out during an eruption. Suspended particles of dust and ash can block out the Earth's sunlight. This reduces solar radiation and lowers mean global temperatures. On the other hand, volcanic eruptions can also enhance global warming by adding carbon dioxide to the atmosphere. To sum up, violent volcanic eruptions can have an impact on global climate, by reducing the amount of solar radiation reaching the Earth's surface, lowering temperatures in the troposphere, and changing atmospheric circulation patterns.

Volcanic Eruption



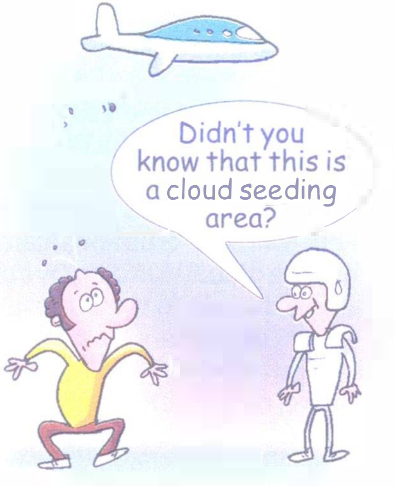
Eyjafjallajokull

Iceland Volcano

The Icelandic volcano Eyjafjallajokull erupted in 2010, spewing enormous clouds of ash into the air. As a result, sulphur dioxide was released into the atmosphere. This sulphur dioxide converts into sulphuric acid droplets known as aerosols, which reflect sunlight, and lower temperatures. Historically, massive eruptions have resulted in global cooling, but many scientists feel that the eruption in Iceland was too small to cause any significant cooling.

What is weather modification?

Weather modification is an attempt to manipulate, or alter the weather with the use of chemicals. Our ancestors attempted to do it through prayers, chants, and dances. Today, scientists use different techniques to dispense fog, suppress hail, control winds, and increase precipitation. One way of controlling weather is by introducing


Didn't you know that this is a cloud seeding area?

Cloud Seeding

Why do some drought prone countries resort to cloud seeding?

Cloud seeding, a form of weather modification, is the attempt to change the amount or type of precipitation that falls from clouds, by dispersing substances into the air that serve to hasten cloud condensation. The usual intent is to increase precipitation in the form of rain in drought hit areas.

Cloud seeding is usually done by spreading quantities of salt crystals or silveriodide through a cloud from above by using particles to an already existing cloud formation which serve as condensation nuclei and help in the making of precipitation. This is known as cloud seeding. Now used worldwide in an effort to induce further rainfall in drought affected areas, cloud seeding has become a recognized method as a form of weather modification.

planes, or from below with artillery or ground to air rockets.

The study of cloud seeding is being conducted in 23 countries worldwide, in 74 ongoing projects since the year 2000. However, the effectiveness of cloud seeding is sometimes uncertain.

Sahel Drought

The Sahel Desert drought, which began in the late 1960's and lasted until the early 1980's, was the worst drought of the 20th century. The drought pushed the Sahara Desert south, destroying farmland.

It had a major impact on many countries including Nigeria, Niger, and Mali.

● *Sneha Rao*

An Aircraft used for Cloud Seeding

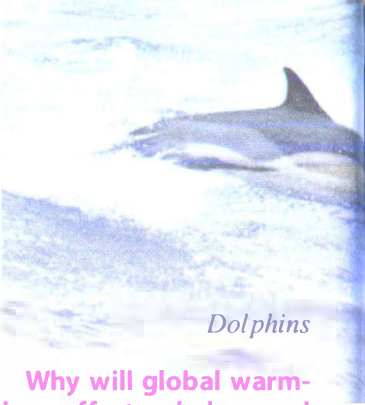
Earliest Drought

In 436 BC, thousands of starving Romans drowned themselves in the Tiber river because severe drought had created an acute shortage of food. This was one of the earliest recorded famines brought about by prolonged drought.

What is an urban heat island?

You might have noticed that when you go to a rural area, the temperature is much lower there than what it is in an urban area. This is because of a phenomenon known as urban heat island. The concrete and asphalt buildings, and the human and industrial activity of urban areas have caused cities to maintain higher temperatures than their surrounding countryside.

Urban areas have fewer trees to provide shade. Concrete buildings have a tendency to trap, and retain the heat from the Sun. This results in an increase in the temperature. Tall buildings and narrow streets also trap and heat the air between them. Vehicles, factories, and air conditioners all add to the warmth.



Dolphins

Why will global warming affect whales and dolphins?

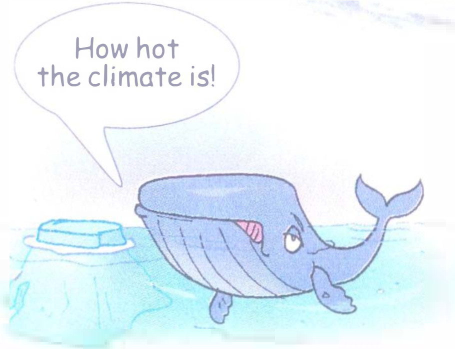
Whales and dolphins are at risk because of global warming. Those that rely on polar waters –belugas, narwhals, and bowhead whales– are likely to be affected by the reduction of sea ice. Less sea ice will allow more commercial shipping, oil, gas, and mining exploration and

Soil Erosion

Human activity causes 10 times more erosion of continental surfaces than natural processes combined. People have been the main cause of worldwide erosion since early in the first millennium. In the USA, 70% of soil erosion is caused by human action.

development, and military activities in previously untouched areas.

The oceans will absorb more carbon dioxide, and become more acid. This means there will be more cetacean disease epidemics, and lower reproductive success and survival rates. Climate change could also mean the end of the 300 or so endangered North Atlantic right whales, as it is affecting their food sources. River dolphins will also suffer from loss of habitat.


How hot the climate is!

Losing Soil

The Loess Plateau in China is well known for its deep loess deposits and serious soil erosion. It has been calculated that one centimetre of soil is washed away each year. The main reason for this is the cutting down of forests, and the ploughing of the land for farming.

Soil Erosion at Loess Plateau

How has climate change affected polar bears?

Polar bears are called the white giants of the Arctic- but today, their very existence is threatened because of climate change. This majestic animal spends much of its life in, around, or on the water - predominantly on sea ice. However, it is a sad fact that sea ice in the Arctic is melting earlier and forming later each year, because of global warming. This means that polar bears are left with less time on the ice to hunt for food- mainly seals- and build up their fat stores for survival in the cold. As their ice habitat shrinks, skinnier and hungrier polar bears face grave challenges. If current climate trends continue unchanged, polar bears could become extinct by the end of this century. This would be a tragedy, because polar bears help us gain an understanding of what is happening throughout the Arctic. If polar bears are at risk, it may also be an indication that something is wrong elsewhere in the Arctic marine ecosystem too.

Polar Bear

Drought in Europe

From AD 879 to 1162, Europe had exceptionally warm weather. This resulted in crop failure. There was widespread starvation, and people died. The failure of crops due to the unseasonal weather also caused the mass migration of large sections of the population.

Which was the first country to take climate change seriously?

The United States was the first country to take climate change seriously. It was in 1965 that the White House first ordered a study to see if the increasing levels of carbon dioxide in the air could be linked to the burning of fossil fuels. When the problem of rising carbon dioxide levels was diagnosed, it was apparent that it was the US itself that was responsible for producing the maximum amount of carbon dioxide. By 1970, there was a lot of international interest in the subject, and in the 1980's the USA was pushing for reforms to cut down on greenhouse gas emissions. However, the baton of leadership in actually bringing about reforms was passed on to the European Union in the 1990's. A great deal has been achieved by different countries in combating climate- but many challenges still remain.

Don't pollute the air.

What is UNEP?

The UNEP or the United Nations Environment Programme is an organization of many countries that co-ordinates the environmental activities of the United Nations. It assists developing countries in implementing environmentally sound policies, and its activities cover a wide range of issues. These include the state of the atmosphere, marine and terrestrial eco systems, environmental governance, and the green economy. It has laid down guidelines on issues like international trade in potentially harmful chemicals, and contamina-

Why was the 1972 UN Conference on Human Environment an important one?

The first United Nations Conference on the Human Environment was held in Stockholm in 1972. Representatives from 113 countries were present, as well as representatives from many international non-governmental and intergovernmental organizations, and many other specialized agencies. This was a milestone, because it was first major international gathering focused on human activities in relationship to the environment. It laid the foundation for environmental action at an international level. It also emphasized that defending and improving the environment must become a goal to be pursued by all countries. Some of the specific issues addressed were the roles which industrition of international waterways. It was founded in June 1972, and has its headquarters in Nairobi, Kenya.

alized countries should have in the process of protecting the environment. The importance of this conference lies in the fact that it led to wider public environmental awareness.

Worst Famines in History

Drought brings famine in its wake. The Great Chinese Famine was one of the worst on record. Lasting three years from 1958 to 1961, it is believed that many millions were killed as a result. The Chinese Famine of 1907 also resulted in the deaths of millions. Famines occurred in India during 1896-1902. The famine that occured in Bengal during 1943-44 resulted in the death of 3.5 million people. The Indian Famine was a six-year disaster that took place between 1896 and 1902. The Horn of Africa also suffered from severe drought between 1983 and 1985, while countries in Europe like England, France and East Prussia have all been devastated by drought at different times during the middle ages.

A View of an African Drought

Why is WMO an important organization?

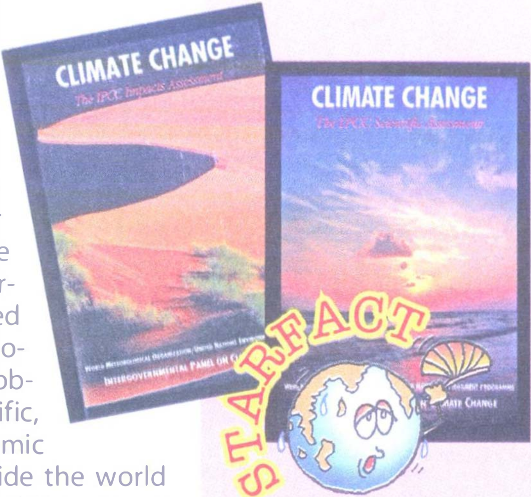
WMO is the World Meteorological Organization. It was established in 1950 as a specialized Agency of the United Nations Organization. Its role is to study the state and behaviour of the Earth's atmosphere, its interaction with the oceans, the climate it produces, and the distribution of water resources. The WMO not only deals with weather and climate, but with all related sciences as well. Since climate and weather are not confined to national boundaries, WMO has a membership of 118 states and territories. It promotes co-operation among the member states for the establishment of networks to make observations relating to weather, climate, and the watercycle. It also facilitates the exchange of data and technologies and assists in training and research. Its programmes provide vital information and advance warnings that saves lives and reduce the impact of disasters like chemical and nuclear accidents, forest fires, and volcanic ash. There is no doubt therefore, that WMO makes significant contributions to the safety and welfare of humanity.

Headquarters of WMO ,Geneva

Logo of WMO

Why does IPCC give us a better understanding of climate change?

The Intergovernmental Panel on Climate Change or IPCC was established by the World Meteorological Organization and the United Nations Environment Programme in 1988. Its main objective was to assess scientific, technical, and socio-economic information, so as to provide the world with a clear scientific view of the current state of climate change, and its potential impact. It is open to all member countries of the United Nations and WMO, and currently has 195 member countries. Scientists from all over the world work together on a voluntary basis to ensure an objective and complete assessment of the information available. The IPCC reflects a balanced view of what is happening to the world's climate.


CLIMATE CHANGE
The IPCC Impacts Assessment
INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE
CLIMATE CHANGE
The IPCC Scientific Assessment
STARFACT

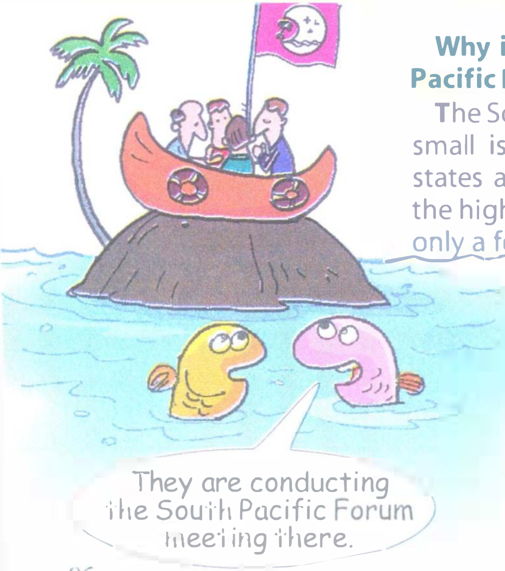
Yes! You have lungs.. but, no air to breathe.

Global Atmospheric Watch

The Global Atmospheric Watch or GAW is a global network organized by the UNO and WMO to measure the state of the atmosphere, and to detect physical and chemical changes in it. It is a partnership involving 80 countries, and was established out of concerns for the state of the atmosphere.

What do you know about the first Climate Change Conference?

The first World Climate Change Conference was held in 1979. It was organized by the World Meteorological Organization at Geneva. The conference provided a platform for discussions about further avenues of research. Scientists had already taken note of the increased levels of carbon dioxide in the atmosphere, and linked it to the increasing amount of fossil fuels that were being burnt, as well as to deforestation. The theory that this was responsible for global warming was considered very plausible by the scientists at the conference.


They are conducting the South Pacific Forum meeting there.

Why is the meeting of the South Pacific Forum significant?

The South Pacific Forum consists of small island member states. These states are basically coral atolls, and the highest points of these atolls are only a few metres above sea level. If sea levels rise anymore because of global warming, many of these islands will be washed away! In 1988, a meeting of the South Pacific Forum was convened to discuss the dangers of climate change and its consequences - one of these

What is AOSIS?

One of the greatest environmental threats to all island countries is global climate change. Even the smallest rise is a potential threat to their survival. The modest rise in sea level that is accepted in the scientific community will inundate at least four low-lying Pacific island countries, and damage many more.

AOSIS stands for the Alliance of Small Island States. It has 42 members and observers from all over the world. The alliance represents 28 of the developing countries, and 20 percent of total UN membership. It was established in 1990, with the aim of making the voice of low lying coastal regions and small island countries heard.

AOSIS Summit

dangers being that there will be 500,000 refugees from these islands in the event that sea levels continue to rise.

Logo of South Pacific Forum

Nobel Prize

The Nobel Peace Prize 2007 was awarded jointly to Intergovernmental Panel on Climate Change and Albert Arnold Gore Jr. "for their efforts to build up and disseminate greater knowledge about man-made climate change and to lay the foundations for the measures that are needed to counteract such change".

● *Nina Dixit*

Kyoto Summit

Why is the Kyoto Protocol an important step against global warming?

The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on climate change. It was adopted in Kyoto, Japan, on 11th December 1997, and came into force on 16 th February 2005. The Kyoto Protocol recognized the fact that developed countries are principally responsible for the current high levels of greenhouse gas emissions in the atmosphere because of their long years of industrial activity. The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries, and the European community, for reducing greenhouse gas emissions.

Why is the Copenhagen Summit considered a partial success?

The United Nations Climate Change conference in Copenhagen, Denmark took place from 7th to 19th December 2009. The Copenhagen conference marked the culmination of a two-year negotiating process to enhance international climate change co-operation. Close to 115 world leaders attended it, making it one of the largest gatherings of world leaders outside of New York. Many hoped that the Copenhagen climate Conference would lay the foundation for a fair, ambitious, and equitable agreement, setting the world towards a path to avoid dangerous climate change. The talks resulted in a political agreement entitled the 'Copenhagen Accord'.

Why were there protests against the Copenhagen conference?

The Copenhagen conference saw protests and arrests, as well as exclusions from the conference. A group of approximately 30 international youth staged a sit-in, refusing to leave the talks until a fair, ambitious, and legally binding treaty was reached. Some delegates even walked out of the centre to join protesters on the outside. The Copenhagen summit did not pass off peacefully.

A Balloon 'Snow man' made by 'GreenPeace' to create awareness about Global Warming

GREENPEACE

Greenpeace

Greenpeace is an independent global organisation that acts to change attitudes and behaviour, to protect and conserve the environment, and to promote peace. Its goal is to ensure the ability of the Earth to nurture life in all its diversity. It tackles worldwide issues such as global warming, deforestation, over fishing, commercial whaling, and nuclear dangers. It is not funded by any government, but relies on individual supporters and foundation grants.

Nepal Cabinet meets near the base camp of Mount Everest

Why did the Nepal cabinet meet at the base of the Himalayas?

The Nepal government held the world's highest cabinet meeting near the base camp of Mount Everest, to raise awareness of the effects of climate change. The meeting was held just ahead on the Copenhagen Summit in 2009.The entire cabinet of 21 ministers travelled in a fleet of helicopters to Kalipatar - a plateau at 5,200m next to Everest's base camp. The Himalayan glaciers - known as the world's third ice-cap - feed some of the region's greatest rivers, including the Ganges, the Yamuna, and the Brahmaputra. They also irrigate farmland in Tibet, Nepal, Bangladesh and India. A spokesman for the Nepal government said the glaciers were melting at a worrying rate, and the historic cabinet meeting was held to highlight this problem. The meeting lasted half an hour, and some of the ministers wore oxygen masks to help them breathe more easily. The ministers signed a declaration on climate change during the meeting.

Why did the Maldives Government hold a cabinet meeting underwater?

Maldives, a tourist paradise featuring coral reefs and white sand beaches, lies just over one metre above sea level and scientists have warned it could devastated if sea levels rise be-

Climate Change Conference 2010

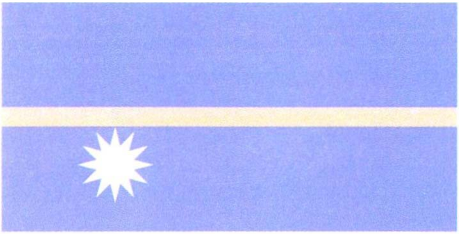
Toronto Target

In 1988, certain targets were laid down at a conference held in Toronto. The targets were that there should be a 20% cut in carbon dioxide emissions by 2005, a reduction in deforestation, and the establishment of a world atmosphere fund to be achieved by levying a 'carbon tax' on developed countries that burn huge amounts of fossil fuels. None of the targets have been achieved so far.

cause of global warming. In October 2009, the government of Maldives held the first ever underwater cabinet meeting to attract the world's attention to the dangers of climate change. President Mohamed Nasheed, dressed in full scuba gear, con-

Maldives Cabinet meets Underwater

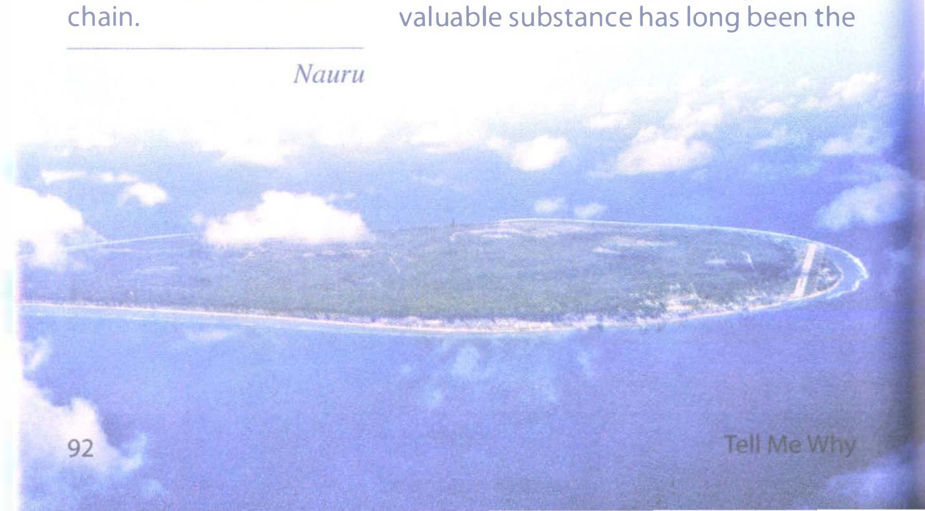
ducted the 30-minute meeting at a depth of six metres off the coast, just north of the capital Male. The government arranged a horseshoe-shaped table on the seabed for the ministers, who communicated using white boards and hand signals. While underwater, they signed a document ahead of the UN Climate Change Conference in Copenhagen in December, calling on all nations to cut their carbon emissions. The ministers had signed their wetsuits, which were auctioned to raise money for coral reef protection in the atoll-chain.



Flag of Nauru

Why is the story of Nauru Island a sad one?

Nauru, the world's smallest republic, is a small oval shaped coral island, located just 40 kilometres south of the Equator. Originally settled by Polynesian and Melanesian explorers, Nauru had little contact with Europeans until whaling ships and other traders began to visit the islands in the 1830s. In 1899, a British company discovered that Nauru was almost solid phosphate, and the subsequent mining of that valuable substance has long been the



Nauru

Kilmaforum- People's Summit

major economic activity on the island. Over a century of mining has stripped much of the phosphate away, and the island is now in deep financial trouble. As a result of the mining, the vast majority of soil and vegetation has also been stripped away. This prevents agriculture from taking place. The loss of vegetation creates a very hot interior, such that rising hot air prevents rain clouds from settling over the island making a difficult situation even more terrible. This contributes to frequent droughts. Nauru's story is a sad one, because it is one of international manipulation that destroyed a country and its native community through corruption and mindless exploitation of the environment.

Klimaforum 09

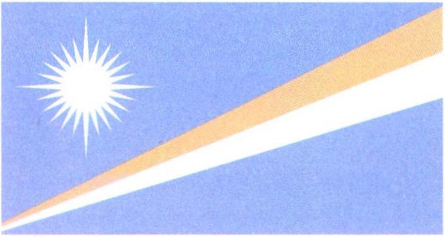
Klimaforum 09 was organized by concerned citizens and environmental activists from around the world as an alternative to the Copenhagen Summit. From December 13th to 18th, more than 300 organisations and numerous individuals from all corner of the world signed the People's Declaration calling for a system change, rather than just a climate change.

● *Arvind Bhat*

Marshall Islands

Why are the Marshall Islands in danger?

The Marshall Islands consist of coral atolls, together with more than 1,000 islets. The atolls are coral deposits on the crater rims of submerged volcanoes that lie just north of the equator. Most of the land is less than one metre above sea level, and the nation faces an uncertain future because of rising seas caused by melting polar ice caps. Rising seas have already caused much damage, and graveyards and coconut trees have been swept into the ocean. Fresh water sources have turned salty, and this has ruined crops and made drinking water scarce. The failure of crops can make the islands soon unfit to live on, and the 61,000 inhabitants live in fear that their homes will be swept underwater at any time. Barely 25 years into its life as an independent country, is the Republic of the Marshall Islands doomed to be swallowed by the ocean?

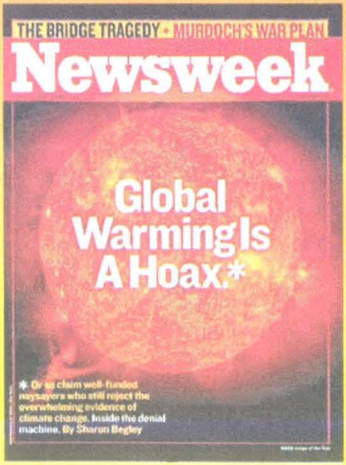


The Flag of Marshall Islands

The HOTTEST HOAX AROUND

Why do some people believe that global warming is not a threat?

Though the majority of scientists have warned the world of the dangers of global warming, there are some who deny that it is happening at all, or if it is, they deny that, it is the result of human activity. They point out that there is no long term data to support the theory that global warming is happening. They argue that any increase in global temperatures could be caused by a natural climate shift, and are confident that plants and animals will adapt to warmer climate patterns. These people believe that the planet is resilient, and able to withstand climate shifts and that the effects of cutting down on industrial activity to reduce greenhouse gases will be far more harmful to mankind than global warming.



THE BRIDGE TRAGEDY • MURDOCH'S WAR PLAN

Newsweek

Global Warming Is A Hoax*

* Or so claim well-funded naysayers who still reject the overwhelming evidence of climate change. Inside the denial machine. By Sharon Begley

The 'Newsweek' Featuring Global Warming as a Hoax

MANORAMA

Tell Me Why

Next issue

WORLD HERITAGE SITES IN INDIA

What you can you do personally to reduce global warming?

While nations hold discussions on ways to reduce greenhouse gas emissions that cause global warming, the individual too, can do his or her part. To begin with, you can reduce the use of electrical appliances that emit greenhouse gases. These include air conditioners and

Prime Minister Manmohan Singh and other delegates at World Climate Conference, Copenhagen

refrigerators that release CFC. You can walk or cycle to nearby places instead of using a car. For longer distances, use the bus or train, instead of your private car. Eat more organic food because organic soils absorb more carbon dioxide. Eat less meat and dairy products, because cows emit large amounts of methane, a greenhouse gas. Cover vessels while cooking to save on energy, and always run a washing machine only with a full load to save on electricity. You should use less paper, because trees are cut to make paper, and you should plant more trees as trees absorb carbon dioxide from the air. In short, if each of us does our bit, we can slow down the process of global warming and save our planet.

Clarifications & Corrections

It is our policy to correct errors, and present differing views and clarifications about the contents in previous issues. Please send in your feedback, mentioning the title and page number.

Ganesh D.Vernekar, a student of class 10, Pavan English Medium High School, Dharwad, Karnataka pointed out some mistakes and gives some add-on information, regarding our April issue - 'States Of India.'

He writes- it is given that Andhra Pradesh is bounded by Madhya Pradesh in north-east, actually it is 'Chattisgarh'.

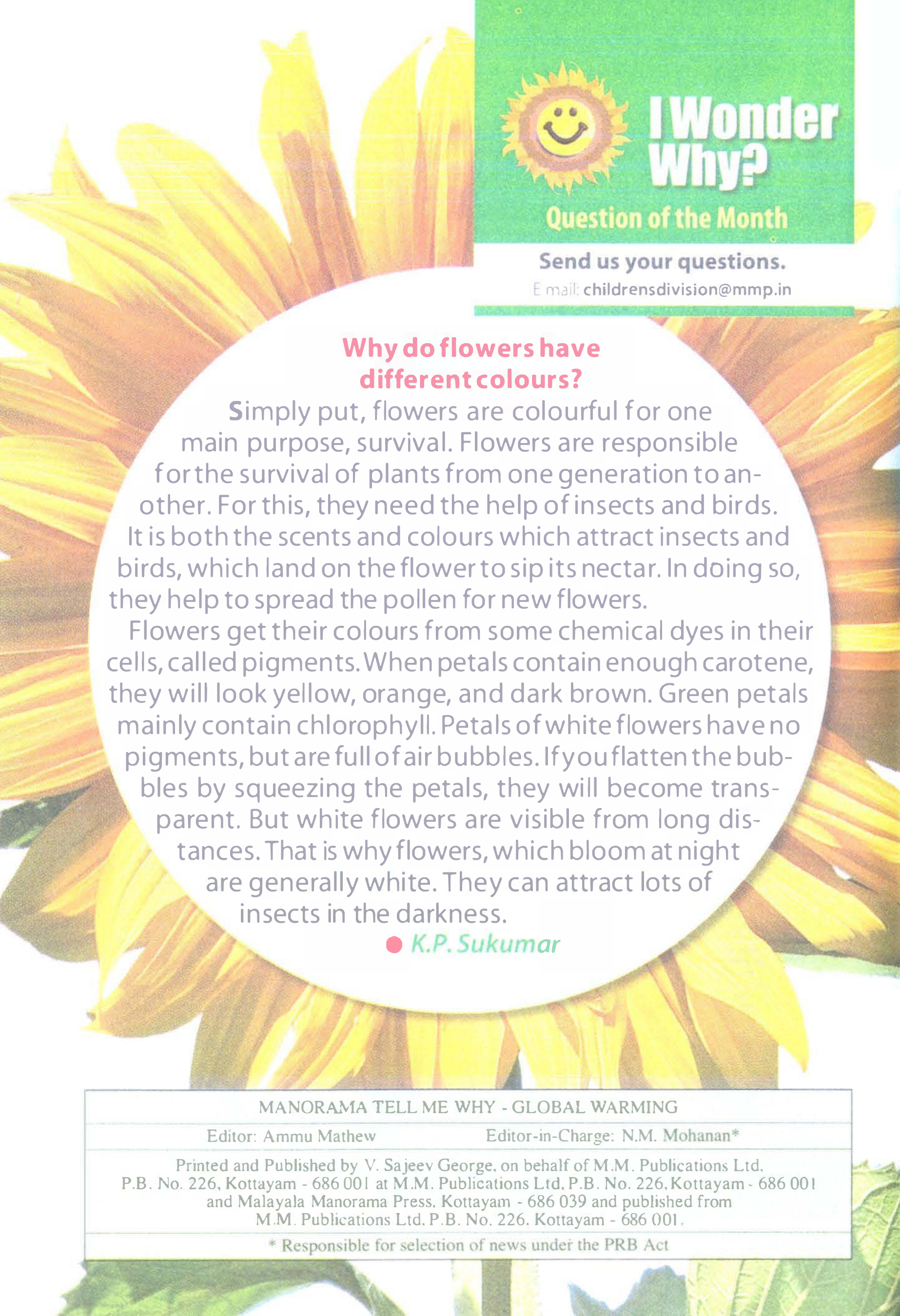
Himachal Pradesh also has boundary lines with Uttarakhand in southeast.

Uttar Pradesh is bounded by Jharkhand, Chattisgarh and Uttarakhand also.

West Bengal shares boundaries with 'Jharkhand' and 'Sikkim' too.

Thank you Ganesh , for your valuable feedback.

- Editor



I Wonder Why?

Question of the Month

Send us your questions.
E mail: **childrensdivision@mmp.in**

Why do flowers have different colours?

Simply put, flowers are colourful for one main purpose, survival. Flowers are responsible for the survival of plants from one generation to another. For this, they need the help of insects and birds. It is both the scents and colours which attract insects and birds, which land on the flower to sip its nectar. In doing so, they help to spread the pollen for new flowers.

Flowers get their colours from some chemical dyes in their cells, called pigments. When petals contain enough carotene, they will look yellow, orange, and dark brown. Green petals mainly contain chlorophyll. Petals of white flowers have no pigments, but are full of air bubbles. If you flatten the bubbles by squeezing the petals, they will become transparent. But white flowers are visible from long distances. That is why flowers, which bloom at night are generally white. They can attract lots of insects in the darkness.

● *K.P. Sukumar*

MANORAMA TELL ME WHY - GLOBAL WARMING

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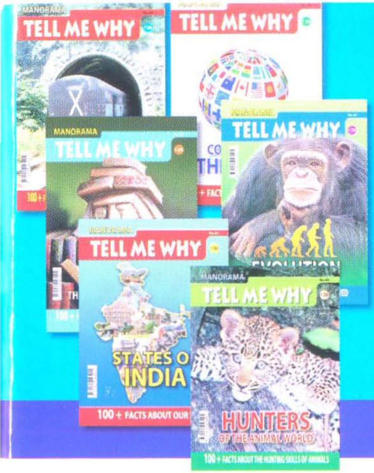
KNOWLEDGE MAGAZINE
FOR CHILDREN

100
Pages


MANORAMA
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100 + FACTS ABOUT OUR
HUNTERS OF THE ANIMAL WORLD
100 + FACTS ABOUT THE HUNTING SKILLS OF ANIMALS
EVOLUTION

A complete reference resource for children

- More than a hundred questions and their answers.
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- Helps in school assignments, projects, competitive exams and quizzes.

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